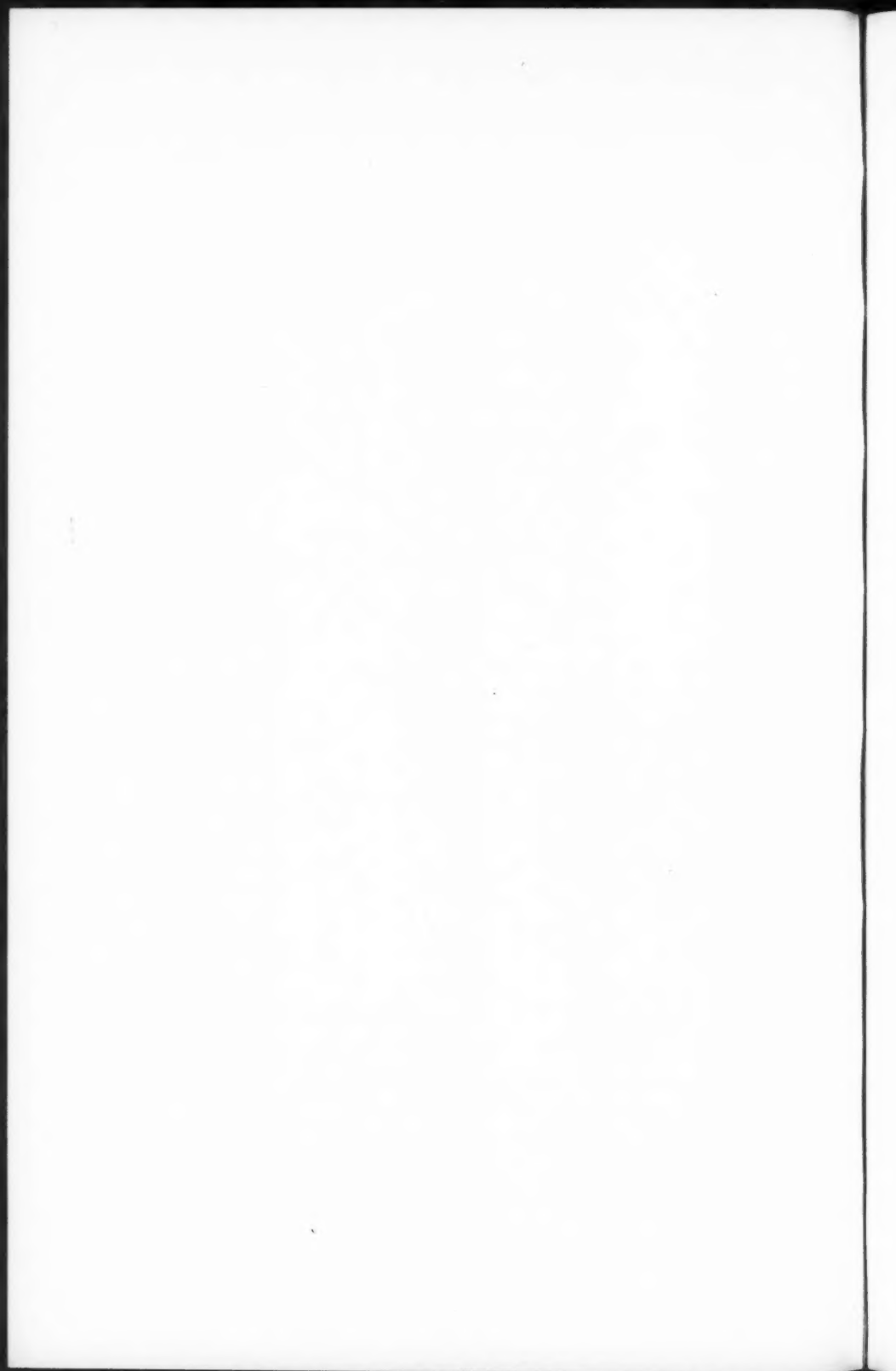




# Journal

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The  
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Vol. 4, No. 2, August, 1961

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### *Books Completed or in Process by Academy Members*

Chester A. Morgan's forthcoming book on *Labor Economics* is scheduled for publication by The Dorsey Press in December, 1961.

Raymond R. Colton, Bernard M. Baruch School of Business, City University of New York, is the author of a new book *Industrial Purchasing, Principles and Practices*, to be published by Charles E. Merrill, Inc., in August, 1961.

Alfred Bornemann is completing a textbook on management for the Bruce Publishing Company.

The fourth annotated edition of William Nielander's *Bibliography on Public Relations* is now available from the University of Texas.

Paul S. Greenlaw, Lowell W. Herron, and Richard H. Rawdon, *Business Simulation in University and Industrial Education*, will be published in December, 1961, by Prentice-Hall, Inc.

William Newman and Charles E. Summer, Jr., *The Process of Management*, was published in May 1961 by Prentice-Hall, Inc.

*The Management of Training Programs* by Frank A. De Phillips, William Berliner, and James J. Cribbin is published by Richard D. Irwin, Inc.

George S. Odiorne is the author of two recently published books. The first, entitled *Effective College Recruiting*, is co-authored with Arthur Hann, also of the University of Michigan, and is published by the Bureau

of Industrial Relations, University of Michigan. Professor Odiorne is also the author of *How Managers Make Things Happen*, published by Prentice-Hall, Inc.

Billy Goetz reports that he has a book in process entitled *The Mathematical Approach to Management: A Guide to Management Intuition*.

H. N. Broom and Justin C. Longenecker of Baylor University are the authors of *Small Business Management* published by the Southwestern Publishing Company.

Powell Niland's book, *Management Problems in the Acquisition of Special Automatic Equipment* has been published by the Harvard Business School, Division of Research. Professor Niland, of Washington University, is also the author of a monograph, *The Role of River Sites in the Industrial Development of the St. Louis Region*, published by the Graduate School of Business Administration, Washington University.

Sterling Schoen, Professor of Management at Washington University, and Wendell L. French, Associate Professor of Management at the University of Washington, are collaborating on a textbook on Personnel Management.

Wayne G. Broehl, Jr., Charles H. Spencer and Ray M. Powell, are the co-authors of a new book entitled *Administering the going Concern: Cases in Business Policy*, published by Prentice-Hall, Inc.

Stanley King Walls has completed a number of technical manuals for various units of the U. S. Navy.

# *Management Science and Group Behavior:*

## *Work-Unit Cohesiveness*

ROBERT T. GOLEMBIEWSKI  
University of Illinois

Awareness of the multiple bases of human behavior has developed gradually over the past half-century from demonstrations of the influence of groups upon behavior. The burgeoning small-group literature is a recent product of this awareness. In contrast to the descriptive nature of the early group literature,<sup>1</sup> the experimental study of *ad hoc* collectivities characterizes recent work. Sociologists and psychologists have spearheaded this research, the goal of which is to develop concepts and operational methods for the detailed description of group behavior.

The rigorous study of the small group is highly relevant to management science. Primarily, this relevance derives from the traditional emphasis in the literature, as in organizational theory, upon formal organization and the individual.<sup>2</sup> The stress on informal organization is a departure from this position, but definitions of the concept have been various and general. Thus small-group analysis, in addition, can help develop a more precise specification of informal organization. The three panels of small-group variables suggest the range of this specificity:

1. *a structural panel*, which includes variables relevant to the description of the relations which exist between group members, e.g., leadership status;
2. *a style panel*, which includes variables relevant to the description of modes of group behavior, e.g., a group with a permissive style of supervision; and
3. *a population panel*, which includes variables relevant to the description of the properties of group members which are significant for group functioning.

Concurrently, small-group analysis provides a model of the research methods necessary in behavioral studies of business.

The purpose of this article is to analyze a conceptual and operational development in small-group behavior to exploit this utility. The focus is upon cohesiveness, a strategic concept in small-group analysis. Its analysis provides a useful illustration-in-depth. But the approach has a dysfunctional narrowness as well.

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<sup>1</sup> A large number of these studies are analyzed in Muzafer and Carolyn Sherif, *An Integration of Studies On Intergroup Relations*, New York: Harper, 1953.

<sup>2</sup> This is the point of such work as that of Chris Argyris, *Personality and Organization: The Conflict Between System and the Individual*, New York: Harper, 1957.

### COHESIVENESS: CONCEPTS

Cohesiveness taps a basic property of the small group: its "stick-togetherness," or the member loyalty which defines the group system. However, several overlapping but distinct conceptions of cohesiveness have been employed. Three general classes of such meanings may be noted:

1. the attraction of a group for its members;
2. the coordination of the efforts of members; and
3. the level of motivation of group members to do a task with zeal and efficiency.

The three meanings could not be included in a single concept. Thus the general restriction of the concept to meaning 1 constituted the first major clarification of cohesiveness. Meanings 2 and 3 do not appear to be unidimensional. They have also been interpreted with an "external" bias. The failure to validate hypotheses derived from meanings 2 and 3 substantiates these observations. Such hypotheses proposed that groups characterized by a high internal "togetherness" (for example) will have high output on an experimental task. Mixed experimental results revealed the too-facile association of a group characteristic with a measure of performance that has an extra-group basis, since a small group characterized by high cohesiveness could be a high producer—that is, more able to control member behavior than a group with low cohesiveness. Or, a small group could be a low producer, i.e., more able to resist extra-group demands than low-cohesiveness groups.

Several concepts of cohesiveness have been developed as "attraction." The earliest modern formulation of cohesiveness held that it "is the total field of forces which act on members to remain in the group. . . ."<sup>3</sup> The deficiencies of this conceptualization may be summarized:

1. The concept emphasizes the "total field of forces" rather than the group, with (as will be shown) important consequences for operational definitions of cohesiveness;
2. The concept is not uni-dimensional, since the "total field of forces" might contain a preponderant weight of elements (such as a prison sentence) which would permit this, as well as the converse, formulation: The greater the forces acting upon individuals to stay in a group, the less attractive the group is to those individuals; and
3. It is impossible to measure the "total field of forces" directly and each indirect operational definition is (at best) a partial measure of, or (at the worst) not related to, the "total field of forces."

More recent work has remedied some of these conceptual problems. Thus one progressive conceptualization emphasized cohesiveness as a group property. It provided, in a subtle but significant change, that "cohesiveness is a . . . property of groups, the attraction which it has for its members, or the forces which are exerted on the members to stay in the group . . ."<sup>4</sup> Unlike the earlier version, the emphasis is upon a potentially-measurable phenomenon, member attraction-

<sup>3</sup> Festinger, Leon, Stanley Schachter, and Kurt Back, *Social Pressures In Informal Groups: A Study of Human Factors In Housing*, New York: Harper, 1950, pp. 164-65.

<sup>4</sup> Festinger, Leon, et al., *Theory and Experiment In Social Communication*, Ann Arbor: Institute for Social Research, 1950, p. 21.

to-group. But the second difficulty noted above still prevails. As a result, reinforced by experimental findings, cohesiveness was further clarified to be a function of the individual members' resultant attraction-to-group.<sup>5</sup> The "resultant" scores for individuals are a function of two classes of factors: group properties; and the motivational states of the persons involved, which are a function of personal needs and characteristics. As Libo put it, cohesiveness "may be hypothesized as a function of the degree to which there is a correspondence between the need structure of all the individual members and the need-satisfying potency in the group."<sup>6</sup> Variables in all three small-group research panels, then, are relevant to cohesiveness. Figure 1 schematically outlines this final conceptualization.<sup>7</sup>

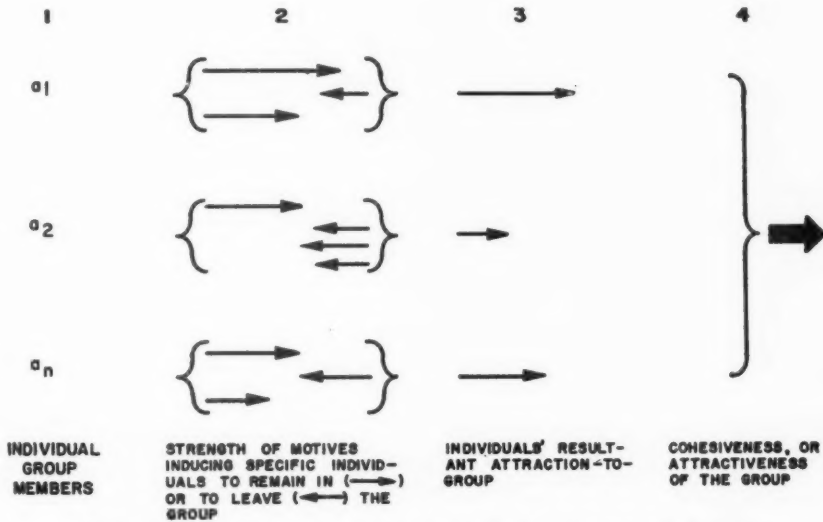


Figure 1. Conceptual schema for the determination of group cohesiveness.

### COHESIVENESS: OPERATIONAL PROBLEMS

The conceptual clarification of cohesiveness, however, did not solve operational problems. That is, deciding upon *what* is to be measured did not solve the problem of *how* it is to be measured. But the clarification did permit a clear indication of what operational developments were necessary.

<sup>5</sup> Cartwright, Dorwin, and Alvin Zander, editors, *Group Dynamics: Research and Theory*, Evanston: Row, Peterson, 1953, pp. 77-78.

<sup>6</sup> Libo, Lester M., *Measuring Group Cohesiveness*, Ann Arbor: Research Center for Group Dynamics, University of Michigan, 1953.

<sup>7</sup> A similar schematization is utilized by Joachim Israel, *Self-Evaluation and Rejection In Groups: Three Experimental Studies and a Conceptual Outline*, Uppsala: Almqvist and Wiksells, 1956, p. 26.



To develop the point, the early operational definitions of cohesiveness usually were based on indexes of sociometric choice (e.g., indexes developed from answers to questions such as: Who are your friends in group x?). Promising results prompted a series of studies of natural-state groups which utilized a number of similar (but not identical) sociometric operational definitions of cohesiveness. The results of such studies may be briefly noted: some strongly confirmed predicted relations of cohesiveness and other variables; others supplied positive but unexciting support; and others yielded unexpected and contradictory results.<sup>8</sup>

Gross and Martin concluded that such mixed results indicated the "logical and methodological inadequacies" of existing cohesiveness concepts and operations.<sup>9</sup> These inadequacies were of several kinds. The early *conceptual* difficulties have been reviewed. A number of *operational* difficulties also existed. In part they were induced by conceptual difficulties. Thus the sociometric choices of individuals are not necessarily related to group cohesiveness, or to any other group property. At best, the sociometric operation was a partial measure of the group property "cohesiveness." Illustratively, one experiment revealed that only 44 per cent of the variance in attraction-to-group could be attributed to attraction-to-members.<sup>10</sup> Second, operational difficulties also resulted because the variety of sociometric operations did not seem to have the same referent.<sup>11</sup> Thus inter-study findings tended to be inconsistent. In addition, the lack of specification of *intervening variables* (which affected the apparently general relations between cohesiveness and other variables) also plagued research, so that previously consistent findings have been contradicted by studies using the same conceptual and operational definitions.<sup>12</sup>

The resulting debate in the literature induced operational as well as conceptual changes. Consistent with conceptual changes, operational definitions of cohesiveness shifted from the earlier partial and individual measures like the sociometric to more general "resultant" measures of attraction-to-group. Schachter, for example, utilized this "resultant" set of questions to measure cohesiveness:<sup>13</sup>

1. Do you want to remain a member of this group?

<sup>8</sup> See, for example, John G. Darley, N. Gross, and W. E. Martin, "Studies of Group Behavior: The Stability, Change, and Interrelations of Psychometric and Sociometric Variables," *Journal of Abnormal and Social Psychology*, vol. 46 (1951), pp. 565-76; and J. G. Darley, N. Gross, W. E. Martin, "Studies In Group Behavior: Factors Associated With the Productivity of Groups," *Journal of Applied Psychology*, vol. 36 (1952), pp. 396-403.

<sup>9</sup> Gross, N. and Martin, W. E., "On Group Cohesiveness," *American Journal of Sociology*, vol. 57 (1952), p. 547.

<sup>10</sup> Bovard, Everett W., Jr., "Interaction and Attraction to the Group," *Human Relations*, vol. 9 (1956), p. 482n.

<sup>11</sup> This point was established by Bernice Eisman, "Some Operational Measures of Cohesiveness and Their Interrelations," *Human Relations*, vol. 12 (1959), pp. 183-89.

<sup>12</sup> See John Downing, "Cohesiveness, Perception, and Values," *Human Relations*, vol. 11 (1958), pp. 157-66.

<sup>13</sup> Schachter, S., "Deviation, Rejection, and Communication," *Journal of Abnormal and Social Psychology*, vol. 46 (1951), pp. 190-207. See especially the reprint of the article in Cartwright and Zander, *op. cit.*, p. 228.



2. How often do you think this group should meet?
3. If enough members decide not to stay so that it seems this group may discontinue, would you like the chance to persuade others to stay?

The "resultant" approach avoids the particularistic deficiencies of such operations as the sociometric. It also taps member attraction to a specific group, again in contrast to the sociometric operation which isolates relations between pairs of individuals. Finally, such "resultant" measures have proved effective in differentiating subjects exposed to high and low cohesiveness-inducing experimental treatments.<sup>14</sup> The use of such "resultant" operations, however, has been limited.

Despite such developments, important operational problems remain open. First, in terms of Figure 1, the translation of the "resultant" attraction-to-group scores of members (step 3) into group cohesiveness (step 4) presents a major difficulty. Thus far, the temporary expedient has been to average the several attraction-to-group scores. The expedient is not satisfactory. For such a mean may disguise within-group differences of a significant nature. Indeed, high intra-set differences may indicate that the entire group is not behaviorally relevant for all members. That is, that the group is categoric rather than psychological. Therefore, cohesiveness operations of substantial predictive utility must measure the "spread" of the data treated in the aggregate.

A second translational difficulty involved steps 3 and 4 in Figure 1. The equal weighting of member attraction-to-group scores in existing cohesiveness operations has a serious defect. For group status may be a crucial element in the weighting of these scores in total group cohesiveness. This position is a tenable one. But the unresolved conceptual and operational difficulties with the structural variable "status" inhibit its implementation.

A third problem is that differences in cohesiveness sources seem important at steps 2, 3, and 4 in Figure 1. Relevant evidence, however, is thin. This evidence may be reviewed in terms of answers to three questions:

1. *What are the sources of attraction-to-group?* Three have been emphasized: (a) personal attractiveness of group members, (b) the attractiveness of the task with which the group mediates, and (c) the prestige of group membership. These sources of attraction are convenient. For they have been induced in experimental subjects by instructions (1 and 3) and planned assignment (2). But they also cover only a limited range. Ideally, however, cohesiveness should be related to a large number of sources in properties in the structural, style, and population panels.

2. *Do different sources of attraction have similar group consequences?* Research by Back presents mixed evidence.<sup>15</sup> Three batches of experimental collectivities were treated so as to expose each batch to one of these sources of attraction: personal attraction; task attraction; and membership prestige gains.

<sup>14</sup> Libo, *op. cit.*, especially pp. 30-31.

<sup>15</sup> Back, K., "Influence Through Social Communication," *Journal of Abnormal and Social Psychology*, vol. 46 (1951), especially pp. 19, 20, 23.

Two-member groups were given the task of the joint preparation of stories about several pictures. Each subject was given slightly different pictures to study alone in order to encourage the exertion of influence in the joint story-preparation. As expected, members of high cohesiveness (HiCo) groups exercised a greater and more equal mutual influence. HiCo members also displayed more equal participation in the group discussion than members of low cohesiveness (LoCo) groups. This consistently reflects greater HiCo involvement in, or greater felt-importance of, the discussion. Back thus concluded that "cohesiveness can indeed be considered as a unitary concept." But there also were quite distinctive inter-source effects on the group process between cohesiveness treatments. To illustrate:

"The Effect of Task Direction. The relationship created by setting up a goal which can be reached by the group activity tends to have somewhat opposite effects from those of the personal attraction relationship. Group activity is seen as a necessity which is to be completely as quickly and as efficiently as possible."

"... If cohesiveness was based on personal attraction, group members wanted to transform the discussion into a longish, pleasant conversation."

Thus, as expected, intervening variables must be specified if cohesiveness is to have high and consistent predictive utility. This complements common-sense expectations and some experimental work. Consider, for example, cohesiveness which is "leader-centered" (as in traditional organization theory) versus cohesiveness which is "member-centered" (as in much of the small-group literature). *A priori*, these types of cohesiveness would have markedly different group effects over a wide range. To suggest the point, small-group style differences (e.g., directive vs. permissive atmospheres) and population differences (e.g., more members who are high vs. low scorers on "authoritarianism") have been observed in groups with leader-centered cohesiveness vs. groups with a member-centered cohesiveness.<sup>16</sup>

3. *Does attraction-to-group from different sources yield increased total attractiveness?* The crucial experiment has not been performed. But its necessary design seems clear enough. Thus a batch of groups could be treated so as to induce only one of the three sources of cohesiveness in any group; and a batch could be exposed to the three sources simultaneously. The test for between-treatment differences would answer this third question. Such an experiment might also reveal the sensitivity of existing "resultant" operations for measuring cohesiveness.

#### COHESIVENESS: "GROUP" DESIGNATION

A central problem—the "unit" to which these concepts and operations applied—was not raised directly in re-evaluating cohesiveness. Paradoxically, however, this problem contributed significantly to that re-evaluation. Most early

<sup>16</sup> See the suggestive evidence in William Haythorn, Arthur Couch, Peter Langham, and Launor F. Carter, "The Behavior of Authoritarian and Equalitarian Personalities In Groups," *Human Relations*, vol. 9 (1956), pp. 57-74.

studies of cohesiveness analyzed "formal" groups, such as courts in a housing development, classrooms, and work units. But the problem, as Festinger, Schachter, and Back noted, was that mutual sociometric choices often seemed to reflect "a kind of subgroup development." They went on:

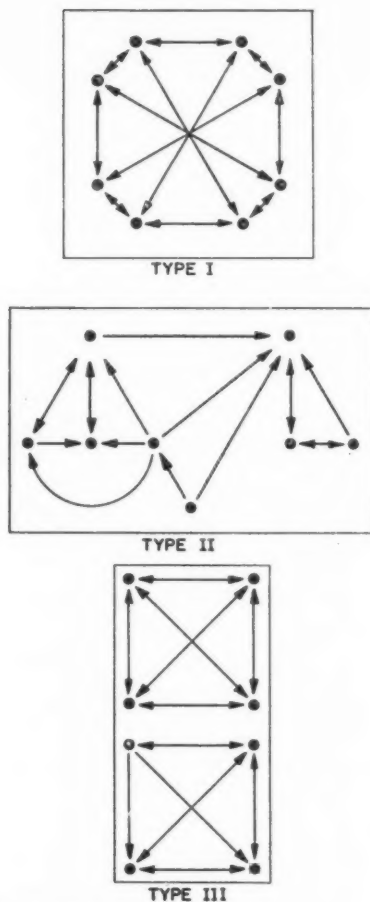
"It is, of course, impossible in the absence of more empirical data to decide just how much such *excess mutual choices* detract from the cohesiveness of the group as a whole. . . . We should not want to subtract the mutual choices completely since the fact that they are mutual certainly does not nullify their contribution to the cohesiveness of the group. As an approximation, we shall correct the proportion of "in-court" choices by subtracting . . . one half of the mutual choice pairs which occurred."<sup>33</sup>

Festinger, Schachter, and Back were interested in the relation between cohesiveness of the courts of a housing development and opinion of, and activity in, a tenants' association. It was hypothesized that high cohesiveness would be associated with a low percentage of "deviants" from court patterns of opinion and activity. The modification for "excess mutual choices" resulted in appreciably higher negative correlations between cohesiveness and percentage of deviants in one case (Westgate courts). There the percentage of total variance accounted for by the correlation increased from 28 per cent to 55 per cent. In another case (Westgate West courts) the change was in the same direction, but not significantly so. The adjustment was quite delicate, however. For a mutual sociometric choice reflects a very strong friendship bond. Thus the position that "excess" choices decreased the attractiveness of the group was, without considerable clarification, quite peculiar. Such clarification was not offered.

Such results, however, may be explained. Consider the three general types of sociometric choice-patterns given in Figure 2. To the degree that formal groups approximate Type I, it seems unnecessary to compensate for "excess mutual choices." For Type I formal groups display a member choice "togetherness" which makes it reasonable to argue that the choice pattern is associated with an underlying opinion agreement. In Type III formal groups, by way of sharp contrast, the formal group is categoric only. Thus "groups" of this type are probably not characterized by any marked, group-induced opinion agreement. However, the case for two sets of opinion agreements is presumptively strong. Sociometrically-defined cohesiveness of Type III formal groups would then probably yield results at odds with those predictable from the general group-theory in which cohesiveness is imbedded. For this theory presupposes that a "group" reflects substantial behavioral similarity. Type II formal groups, finally, are intermediate to types I and III. This type is characterized by a moderately unified choice pattern and thus, reasonably, by a moderate tendency to share opinions.

Some distribution of these general types may be expected in any batch of small, formal units. This permits an explanation of the higher correlation which resulted from the "adjustment" for mutual pairs. Westgate courts (hypothesizedly) tended toward Types II and especially III. To explain, the "adjust-

<sup>33</sup> Festinger, Schachter, and Back, *op. cit.*, p. 95 (Italics are the author's).



LEGEND  $\longrightarrow$  a CHOOSES b  
 $\longleftrightarrow$  a AND b CHOOSE EACH OTHER

Figure 2. Hypothetical patterns of positive sociometric choices in formal groups.

ment" reduced the estimates of the cohesiveness of Type III groups significantly more than those of Type II groups. Type III groups (by definition) also would have a greater percentage of deviants. Hence the higher post-adjustment correlation between "per cent deviants" and court cohesiveness in Westgate. A similar argument can be developed to explain the less marked effect of the "adjustment" in Westgate West.

Thus the concentration on a formal unit begged the basic question of "group" designation. The estimates of a group's cohesiveness were "mixed" because the behaviorally-relevant part of a particular formal unit varied from respond-

ent to respondent. These exhortations, of course, do not solve the designational difficulties. The point here is the more limited one of demonstrating how differences in "group" designations affect cohesiveness research. Incidentally, as attempts with matrix algebra and graph theory demonstrate, "group" designation (especially when large data batches are involved) is an effort in which the exact sciences will be indispensable.<sup>18</sup>

### COHESIVENESS: MANAGEMENT-RELEVANT FINDINGS

Shortcomings notwithstanding, cohesiveness has been valuable in the study of significant problems of group life relevant to management science and practice. On the broadest level, whether in experimental or natural-state situations, the small group may serve four functions:<sup>19</sup>

1. The group may be an agency through which members obtain and evaluate information about their environment;
2. The group may create some aspects of reality which are relevant for the individual and may control some aspects of the physical and social environment of consequence to individual members;
3. The group may fill a need for affiliation and affect; and
4. The group may function as a defense against the extra-group environment.

These functions imply a basic law of the social physics of groups. The more effective a group is in serving such functions, the greater its cohesiveness (and vice versa). And greater cohesiveness means greater group demands which may be placed upon members before their withdrawal is forced. Experimental studies have validated a number of logical derivations from this basic statement of relations. One class of such studies, for example, deals with the change of individual behavior. It has a patent relevance to management. The general hypothesis underlying this research is that the "magnitude of the change which the group can induce (in its internal power) will be equal to or less than the magnitude of . . . its cohesiveness."<sup>20</sup> The main results of experiments confirming this hypothesis may be abstracted:<sup>21</sup>

1. *amount and intensity of communications*: studies have generally shown that participation is more equal and more intense in HiCo than in LoCo groups, consistent with the prediction that participation in HiCo groups is more valued by members;
2. *rejection of deviants*: HiCo groups tend to reject those who deviate from group opinion more than LoCo groups do; and communications directed toward deviants tend to be initially more frequent as well as finally less frequent in HiCo groups than in LoCo, which reflects more marked attempts in HiCo groups to preserve the psychological

<sup>18</sup> Weiss, Robert S., and Eugene Jacobson, "A Method for the Analysis of the Structure of Complex Organizations," *American Sociological Review*, vol. 20 (1955), pp. 661-68; and Dorwin Cartwright, "The Potential Contribution of Graph Theory to Organization Theory," in Mason Haire, editor, *Modern Organization Theory: A Symposium of the Foundation for Research on Human Behavior*, New York: Wiley, 1959, pp. 254-71.

<sup>19</sup> See Festinger, Back, Schachter, Kelley, and Thibault, *op. cit.*, for the development of the underlying theory.

<sup>20</sup> Festinger, Schachter, and Back, *op. cit.*, p. 166.

<sup>21</sup> Consult Schachter, *op. cit.*; and Leonard Berkowitz, "Group Standards, Cohesiveness, and Productivity," *Human Relations*, vol. 7 (1954), pp. 509-19.

group first by conversion of the deviant and then by rejecting him convincingly when conversion does not result;

3. *willingness to accept influence*: HiCo members are more susceptible to group influence than LoCo members, a relation most interestingly reflected in experimental demonstrations than HiCo groups are more successful in maintaining high or low production levels than LoCo groups; and
4. *reactions toward external threat or deprivation*: HiCo groups are more capable of producing and sustaining a hostile reaction against "external" threat than LoCo groups.

In addition, cohesiveness has been used successfully as an intervening variable to reconcile seemingly conflicting, or to relate previously disparate, findings. This further reinforces the support of the theoretical underpinning of cohesiveness research.

The conclusion is that many group processes with organization counterparts are related to cohesiveness. This connection receives direct support from such well-managed studies within organizations as that by Seashore.<sup>22</sup> Seashore studied 228 relatively small, formal work-units in a plant manufacturing heavy machinery. Two elements limit his analysis of these work units. First, Seashore used an index of cohesiveness based upon data from answers to five fixed-response questions tapping these areas:

1. Are you really a part of the group?
2. Do you want to stay in the group?
3. How do the men get along?
4. Do the men stick together?
5. Do the men help each other?

There are, however, sharp limits on the use of the combined data derived from answers to these questions. Thus only questions 1 and 2, as Seashore noted, "appear to be relatively pure translations from the [resultant] definition of cohesiveness." Moreover, the low intercorrelations of data sets from questions 1 and 2 with each other (.30) and with questions 3-5 (tending toward the low end of the range .15-.38) also advise caution in interpreting the cohesiveness index.

Second, the high intercorrelations of the data sets from questions 3-5 (.62, .64, and .70) also suggest that the choice-base was often narrower than the formal work-unit. Among other possibilities, questions 3-5 may tap responses referring to psychologically-relevant systems within the work units, while questions 1 and 2 may reflect judgments about the entire formal unit. The nature of the questions supports this surmise. In any case, Seashore realized that his research units were not necessarily psychological groups. But the analysis of variance of the cohesiveness scores by work unit proved statistically significant. This provided some justification for treating the work teams as psychological groups.

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<sup>22</sup> Seashore, Stanley E., *Group Cohesiveness In the Industrial Work Group*, Ann Arbor: Survey Research Center, University of Michigan, 1954, especially pp. 39, 38, 36.



Seashore's findings underscore the generality and importance of cohesiveness. His findings are consistent with laboratory research or are logically derivable from it. The findings are particularly noteworthy because the two reservations noted above would probably tend to dilute the strength of the relations in the data sample. Seashore's work tapped the co-variation of cohesiveness and three classes of variables: (1) work-related anxiety, (2) productivity, and (3) situational characteristics of formal work-units and their members. His findings are consistent. The findings closely tie the several significant work-site variables to cohesiveness relations. Seashore's findings may be abstracted and commented upon briefly.<sup>23</sup>

1. The hypothesis that the "cohesive work group promotes effective support for the individual in his encounters with anxiety-producing aspects of his work environment" was generally and sometimes significantly supported. Such findings are consistent with the "resultant" conception of cohesiveness discussed above. Moreover, the tension-reduction associated with cohesiveness helps to explain group influence over member behavior. This finding also has a patent practical importance. For high tension has many dysfunctional consequences in organization.<sup>24</sup>

2. The hypothesis that "the degree of cohesiveness . . . determines the power of the group to induce forces toward uniformity of work standards within the group and toward the formation of differential standards between groups" was demonstrated in two ways: (a) worker productivity was more uniform in HiCo than LoCo work units, and (b) productivity differences between work units were greater in HiCo than LoCo units. These findings are consistent with laboratory research. Cohesiveness, however, often has been associated with "good" (e.g., high productivity) group characteristics. Seashore's findings underscore the importance of the specification of intervening variables such as the style characteristics of groups. The centrality of cohesiveness—whether the style it supports is high or low productivity—is patent for management.

3. Cohesiveness was related to two measures of the "opportunity for interaction": (a) cohesiveness was related to the percentage of work unit members with three or more years on their current job, and (b) cohesiveness was curvilinearly related to work unit size, i.e., both high and low cohesiveness were related to smaller size. Relevant "situational characteristics" should include structural, style, and population properties. Seashore's main emphasis was thus narrow. But his findings were consistent with cohesiveness theory. Length of service reasonably reflects attraction-to-group, for transfers out of hostile work units would be expected. And small size—when length of service is not controlled—understandably encourages high (or low) cohesiveness because of the greater intimacy (or unfavorable reaction) possible in smaller units. These

<sup>23</sup> Seashore, *op. cit.*, p. 61 (I); pp. 63, 67, 69, 70 (II); and pp. 88-91 (III).

<sup>24</sup> Some of the dysfunctional consequences of tension from budgets on first-line supervisors are isolated and analyzed in Chris Argyris, *The Impact of Budgets On People*, Controllership Foundation, Inc., 1952, especially pp. 16-23.

findings also suggest possible management techniques for manipulating cohesiveness.

### CONCLUSION

This review of cohesiveness research sketches a mixed picture of incomplete analytical development and demonstrated theoretical importance. Despite the unsolved problems, however, four things seem clear. First, cohesiveness is administratively relevant. Existing organization theory (such as the principles of administration) does not provide for such differences. Indeed, this theory implies a mechanics rather than a psychology, as critics have long noted. Wide recognition of this theoretical bias induced the general emphasis on informal organization. But informal organization rephrased the research question. The development of concepts like cohesiveness is necessary to exploit such macroscopic insights. In an applied sense, cohesiveness also has important pay-offs. For organization is controlled behavior, and cohesiveness is related to the degree of behavioral control which may be exerted by a group. Thus the simple technique of allowing work-unit members to choose each other often results in higher output. This method is more likely to induce high work-unit cohesiveness than assignment by formal authority. For, *ceteris paribus*, the "personal attractiveness" source of cohesiveness is more likely to be induced when self-choice is permitted. In one case, to illustrate, self-selection vs. selection by management of construction teams reveals that self-selected teams were more effective on four criteria: job satisfaction; turnover rate; an index of labor cost; and an index of materials cost.<sup>25</sup>

Second, cohesiveness research provides convenient conceptual and operational tools for natural-state empirical studies. The wide use of these analytical tools is necessary as well as convenient. For small-group analysis depends largely on the study of isolated, *ad hoc* groups in laboratory situations. The study of small groups in formal organizations, then, may validate and/or redirect laboratory research.

Third, such research will have important side effects. Thus the physical sciences have dealt with levels of organization (the atom, the molecule) and with their integration (e.g., "valence"). Analogically, the small group is a level of informal organization important in itself, but not capable of accounting for behavior at other levels.<sup>26</sup> In short, small-group theory must be integrated with the theory derived from other levels of formal and informal organization.<sup>27</sup> The contributions of students from disciplines concerned with management and organization will be valuable in this effort. For such disciplines have developed useful descriptive literatures dealing with macroscopic levels of organization. In any case, the research involvement of large numbers

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<sup>25</sup> Van Zelst, Raymond H., "Validation of A Sociometric Regrouping Procedure," *Journal of Abnormal and Social Psychology*, vol. 47 (1952), pp. 299-301.

<sup>26</sup> Novikoff, A. B., "The Concept of Integrative Levels In Biology," *Science*, vol. 101 (1945), pp. 209-15.

<sup>27</sup> Simon, Herbert A., "Comments On the Theory of Organizations," *American Political Science Review*, vol. 46 (1952), pp. 1130-39.



of researchers from a number of disciplines will at least serve to acquaint them with a style of research that has paid significant dividends.

Fourth, cohesiveness research suggests the outline of the task of the application of the exact sciences to the problems of management. As in the physical sciences, empirical research demands the development of limited and general theoretical statements and of the mathematics such statements require.<sup>28</sup> The degree to which such demands are met and fed back into empirical research will influence substantially the pace of development of management science.

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<sup>28</sup> Such a treatment of cohesiveness, for example, is provided by Herbert A. Simon and Harold C. Guetzkow, "A Model of Short- and Long-Run Mechanisms Involved in Pressures Toward Uniformity In Groups," *Psychological Review*, vol. 62 (1955), pp. 56-68.

## *Special Announcement*

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# Frederick Winslow Taylor Revisited

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A well-known remark of John Maynard Keynes says that "practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist."<sup>1</sup> It is safe to assume that similar spirits are haunting the managers and administrators of our factories, offices and bureaus.

Since Keynes noted in the same passage that few are influenced by new theories after they are twenty-five or thirty years of age, it would seem that the ghost of Elton Mayo must presently reign supreme among the postwar generation of managers.

And yet, the phantom of Frederick Winslow Taylor is not quite dead. Born more than one hundred years ago (1856), departed for more than two-score years (1915), and father of scientific management for over three-quarters of a century (1882), the consulting engineer from Chestnut Hill, Philadelphia has been subjected to many second thoughts—particularly since the 1930's. Now that the heat is on Mayo *et al.*,<sup>2</sup> another look at and some further thoughts about Taylor appear indicated.

## CHARGES AND COUNTERCHARGES

The value of a good part of Taylor's work is hardly questioned nowadays. His fundamental insight that control rests on measurement was simplicity itself but, as the French say, *il fallait y penser*, i.e., someone had to think it out first. A few years back, Peter F. Drucker undertook a reappraisal of scientific management which he credited for being all but a systematic philosophy of workers and work:

Altogether it may well be the most powerful as well as the most lasting contribution America has made to Western thought since the Federalist Papers. As long as industrial society endures, we shall never lose again the insight that human work can be studied systematically, can be analyzed, can be improved by work on its elementary parts.<sup>3</sup>

On the other hand, added Drucker, scientific management had two big blind

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<sup>1</sup> John Maynard Keynes, *The General Theory of Employment, Interest and Money* (New York: Harcourt, Brace and Company, 1936), p. 383.

<sup>2</sup> See the section on "Human Relations in Perspective" in *Human Relations in Management*, eds. I. L. Heckmann and S. G. Huneryager (Cincinnati: South-Western Publishing Company, 1960).

<sup>3</sup> Peter F. Drucker, *The Practice of Management* (New York: Harper and Brothers, 1954), p. 280.

spots: (1) the replacement of meaningful "jobs" by poorly integrated "motions," and (2) the separation of planning from doing.<sup>4</sup>

Unfortunately, few authors have managed to share Drucker's insight into Taylor's works. A garden variety of critics, generally to be encountered in the introductory chapters of books or the opening remarks of articles on human relations, have commonly given Taylor the once-over lightly. The most charitable thing to be said about such synopses is that they are dutiful copies of what someone else said on the subject. Hence, an endless echoing of statements to the effect that Taylor:

1. Emphasized the individual worker and ignored the group.
2. Sacrificed the worker to the system.
3. Stressed the use of financial incentives to induce workers to produce more.

The purpose of this paper will be to set the record straighter on this count. Since clichés become anonymous anyway, no particular author need be refuted.

### SOME OF THE FACTS

#### A. Individuals

Quoting out of context is an old trick of polemicists, and Taylor was taken to task more than once for some of his pronouncements. As far as stressing the individual worker is concerned, however, there can be little doubt that Taylor did just that. Examples can be multiplied.

In dealing with workmen under [scientific management], it is an inflexible rule to talk to and deal with only one man at a time, since each workman has his own special abilities and limitations, and since we are not dealing with men in masses, but are trying to develop each individual man to his highest state of efficiency and prosperity.<sup>5</sup>

Throughout the early stages of organization each change made should affect one workman only, and after the single man affected has become used to the new order of things, then change one man after another from the old system to the new . . .<sup>6</sup>

We are individualizing every man.<sup>7</sup>

#### B. Groups

It is common to read that Taylor ignored groups and overlooked their influence. If anything, such statements prove that their authors never bothered to read Taylor, who related in every book and testimony how he was "indoctrinated" by his co-workers at the Midvale Steel Works, and how he "soldiered" along with them.

Whatever the workingmen of this country are or are not, they are not damned fools. That is straight. . . . It just takes one cut [in piece rate] like this—just one—to make

<sup>4</sup> *Ibid.*, pp. 282-87. Taylor, who had his own qualms about specialization, should properly be pronounced guilty on the second count only.

<sup>5</sup> Frederick Winslow Taylor, *Scientific Management* (New York: Harper and Brothers, 1947). This book contains *Shop Management*, *The Principles of Scientific Management*, and the *Testimony Before the Special House Committee*. There is also a *Testimony Before the Senate Commission on Industrial Relations* (1914) which is included in U. S. Senate, Commission on Industrial Relations, *Industrial Relations*, 64th Cong. 1st Sess., 1916. This quotation is from *Principles*, p. 43.

<sup>6</sup> *Shop Management*, p. 135.

<sup>7</sup> *Senate Testimony*, p. 780.

them soldier for life. . . . I did not even have to have it before I started soldiering. I never got my cut. I was too keen. The boys informed me beforehand, when I was an apprentice.<sup>8</sup>

It evidently becomes for each man's interest, then, to see that no job is done faster than it has been done in the past. The younger and less experienced men are taught this by their elders, and all possible persuasion and social pressure is brought to bear upon the greedy and selfish men. . . .<sup>9</sup>

The workmen together had carefully planned just how fast each job should be done, and they had set a pace for each machine throughout the shop, which was limited to about one-third of a good day's work. Every new workman who came into the shop was told at once by the other men exactly how much of each kind of work he has to do, and unless he obeyed these instructions he was sure before long to be driven out of the place by the men.<sup>10</sup>

Such statements make one wonder about the people who "discovered" the group's influence after reading the Bank Wiring Room part of the Hawthorne Studies.

#### C. The System

Speaking of the bitter fight he waged as a gang boss against his subordinates' soldiering, Taylor commented:

My anger and hard feeling were stirred up against the system; not against the men.<sup>11</sup>

The system in case was the piecework plan. Describing the restrictions of output which he practiced with other workers, Taylor added:

We felt justified in doing this, owing to the piecework system—that is, owing to the necessity for soldiering under the piecework system. . . .<sup>12</sup>

Under the finest type of ordinary management where workmen give their best *initiative* and, in return, receive some *special incentive* from their employers, soldiering is bound to take place because workers fear rate cuts—whether or not they ever experienced one.<sup>13</sup> Hence, mutual suspicion and deceit. From this first-hand experience Taylor concluded that commonly used systems were bad. Thus, when in the preface of his main book he stated: "In the past the man has been first; in the future the system must be first,"<sup>14</sup> he was clearly thinking of a new system—scientific management.<sup>15</sup>

#### D. Financial Incentives

There is little doubt that Taylor considered money an essential adjunct of the new order:

The one element which the Towne-Halsey system and task management have in common

<sup>8</sup> *Ibid.*, p. 771.

<sup>9</sup> *Shop Management*, p. 34.

<sup>10</sup> *Principles*, p. 49.

<sup>11</sup> *House Testimony*, p. 83.

<sup>12</sup> *Ibid.*, p. 79.

<sup>13</sup> *Principles*, pp. 23–24, 34.

<sup>14</sup> *Ibid.*, p. 7.

<sup>15</sup> Taylor preferred to call it "task management" (*Principles*, p. 120) or "systematic management" (*Principles*, pp. 6–7).

is that both recognize the all-important fact that workmen cannot be induced to work extra-hard without receiving extra pay.<sup>16</sup>

Throughout Taylor's Testimonies the magic words "from 33 to 100 per cent higher wages" keep popping all the time—clearly reflecting his concern for financial rewards.

#### E. Preliminary Conclusion

Thus far then, it appears correct to say that Taylor:

1. Stressed the individual worker.
2. Was aware of the "small face-to-face group."
3. Visualized a new system that would replace the Old Régime.
4. Considered financial rewards essential to the success of scientific management.

So far so good. It remains, however, to study the context in which these statements were made, and to interpret them in terms of Taylor's philosophy.

### MORE FACTS AND THEIR INTERPRETATION

#### A. The Moral Viewpoint

Hardly a word of blame is to be found in the Hawthorne Studies on matters such as restriction of output or falsification of records. Not so in Taylor's works where a moral viewpoint clearly underlies pronouncements on individuals, groups and systems.

This is readily apparent in Taylor's vocabulary which abounds in terms such as right and wrong, reward and punishment, virtues and defects, example and conscience, etc. The only visible slip is in the matter of swearing which Taylor practiced profusely. This habit even led one of the examiners to ask him:

Mr. Redfield: Does not scientific management take the third commandment into account?

Mr. Taylor: I am sorry to say that it does not take it into account as it ought to. I was brought up wrong—<sup>17</sup>

In general, Taylor considered that conventional management led to waste, injustice and character deterioration:

This paper has been written:

*First.* To point out, through a series of simple illustrations, the great loss [of human effort] which the country is suffering through inefficiency in almost all of our daily acts.<sup>18</sup>

It is a curious fact that with the people to whom the writer has described this system, the first feeling, particularly among those more philanthropically inclined, is one of pity for the inferior workmen who lost their jobs in order to make way for the first-class men. This sympathy is entirely misplaced. . . . The feeling, instead of being one of pity for the inferior workmen, should be one of congratulation and rejoicing that many first-class men—who through unfortunate circumstances had never had the opportunity of proving their worth—at last were given the chance to earn high wages and become prosperous.<sup>19</sup>

Unfortunately for the character of the workman, soldiering involves a deliberate attempt

<sup>16</sup> *Shop Management*, p. 43.

<sup>17</sup> *House Testimony*, p. 219.

<sup>18</sup> *Principles*, p. 7.

<sup>19</sup> *Shop Management*, pp. 57-58.

to mislead and deceive his employer, and thus upright and straightforward workmen are compelled to become more or less hypocritical.<sup>20</sup>

The loss of ambition and initiative will be cited, which takes place in workmen when they are herded into gangs instead of being treated as separate individuals.<sup>21</sup>

On the other hand, under scientific management, workers "live rather better, begin to save money, become more sober and work more steadily. . . . This certainly forms one of the strongest reasons for advocating this type of management."<sup>22</sup>

The editor called the Philadelphian's last and main book "Mr. Taylor's Philosophy of Human Labor."<sup>23</sup> This name was quite apt since all systems ultimately rest on a vision of man and society—and Elton Mayo certainly had his. It is well known that the Protestant Ethic stressed *continuous, systematic, methodic* effort—not just plain hard work.<sup>24</sup> Such emphasis is reflected in the first two "new duties assumed by management" in Taylor's new system:

*First.* [The management] develop a science for each element of a man's work, which replaces the old-rule-of-thumb method.

*Second.* [The management] scientifically select and then train, teach, and develop the workman, whereas in the past he chose his own work and trained himself as best he could.<sup>25</sup>

Another tenet of the Protestant Ethic considers salvation as a strictly personal affair between God and man. A parallel vision is found in Taylor's attempts to substitute the superior-subordinate collaboration for the relationships between workers.<sup>26</sup> The last two principles of scientific management emphasize this viewpoint:

*Third.* Bringing the first-class [workman] and the science of [work] together, through the constant help and watchfulness of the management, and through paying each man a large daily bonus for working fast and doing what he is told to do.

*Fourth.* An almost equal division of the work and responsibility between the workman and the management. All day long the management work almost side by side with the men, helping, encouraging, and smoothing the way for them, while in the past they stood at one side, gave the men but little help, and threw on to them almost the entire responsibility as to methods, implements, speed, and harmonious co-operation.<sup>27</sup>

Taylor's Puritan frame of reference—compounded with a touch of Quaker concern for responsible service and Unitarian rationalism<sup>28</sup>—thus goes a long way toward explaining his attitudes towards individuals, groups and systems.

<sup>20</sup> *Ibid.*, p. 35.

<sup>21</sup> *House Testimony*, p. 219.

<sup>22</sup> *Shop Management*, p. 27.

<sup>23</sup> Preface of the Harper edition, p. 14.

<sup>24</sup> Max Weber, *The Protestant Ethic and the Spirit of Capitalism* (New York: Charles Scribner's Sons, 1958), p. 235 and *passim*.

<sup>25</sup> *Principles*, pp. 36-37. These "new duties" are commonly called the "Principles of Scientific Management." See *House Testimony*, p. 40.

<sup>26</sup> *Principles*, pp. 39, 115, 143.

<sup>27</sup> *House Testimony*, p. 77.

<sup>28</sup> All three denominations were present in Taylor's background. Frank Barkley Copley, *Frederick W. Taylor, Father of Scientific Management*, Vol. I (New York: Harper and Brothers, 1923), *passim*.



It also takes care of the first two clichés listed in the Introduction. Now to the third.

### B. The "Task-and-Bonus" Concept

There is one part of Frederick Winslow Taylor's work which appears to be as dead as a doornail, and that is his "Differential Rate Piece Work."

This wage system provided for two rates: one low rate to be applied to all workers who did not attain standard, and a high rate for those who attained or exceeded standard—in short, a task-and-bonus plan.<sup>29</sup> Commonly viewed as a piece-rate plan that failed in competition with systems such as the 100% Premium or the Halsey, this plan is presently relegated to the Museum of Industrial Management—if such a place exists.

Yet, a careful reading of Taylor places the task-and-bonus plan in a completely different light.

It is well known that, in this system, the daily *task* (= standard) was set for a *first-class* (= superior) worker who was expected to perform the task most of the time and to better it once in a while. In either case, the first-class worker was to receive "from 33 to 100 per cent higher wages" (= *bonus*) than the average for his trade.<sup>30</sup>

The reward, however, was not for *producing more*—in a spirit of "the more you produce, the more you earn"—but for *carrying out orders*. Taylor is quite vocal on this point, and his pronouncements still bear a lesson for managers burdened with wage incentive grievances:

The mistake which is usually made in dealing with union men, lies in giving an order which affects a number of workmen at the same time and in laying stress upon the increase in the output which is demanded instead of emphasizing one by one the details which the workman is to carry out in order to attain the desired result. In the first case a clear issue is raised: say that the man must turn out fifty per cent. more pieces than he has in the past, and therefore it will be assumed by most people that he must *work* fifty per cent harder. In this issue the union is more than likely to have the sympathy of the general public, and they can logically take it up and fight upon it. If, however, the workman is given a series of plain, simple, and reasonable orders, and is offered a premium for carrying them out, the union will have a much more difficult task in defending the man who disobeys them.<sup>31</sup>

The greatest incentive to bring [the science and the trained man] together is this, that you show the man that if he does the new way in the first place he will get from 33 to 100 per cent higher wages. . . . Every time he carries out the new set of laws, he increases his output and his wages from 33 to 100 per cent.<sup>32</sup>

Answering a question regarding tasks simplified through mechanization or motion-study, Taylor clearly emphasized the *task* rather than the *piece*.

<sup>29</sup> Actually, this is the official title of Gantt's Plan which shares with Taylor's Differential (a) a large daily task, (b) high pay for success, and (c) loss in case of failure. *Shop Management*, pp. 73-80.

<sup>30</sup> Workers paid under a wage incentive system generally earn from 15 to 20% more per hour than they would under a time wage system. William B. Wolf, *Wage Incentives as a Managerial Tool* (New York: Columbia University Press, 1957), p. 21.

<sup>31</sup> *Shop Management*, pp. 192-93. This is also quite evident in the double wage paid to workers being time-studied, in exchange for a full effort: *Senate Testimony*, p. 778.

<sup>32</sup> *Senate Testimony*, p. 776.

I want to make the fact perfectly clear that there is no implied bargain under scientific management that the pay of the man shall be proportional to the number of pieces turned out. There is no bargain of that sort. There is a new type of bargain, however, and that is this: Under scientific management we propose at all times to give the workman a perfectly fair and just task, a task which we would not on our side hesitate to do ourselves, one which will never overwork a competent man. But that the moment we find a new and improved or a better way of doing the work everyone will fall into line and work at once according to the new method. It is not a question of how much work the man turned out before with another method.<sup>33</sup>

This view bears striking resemblance to Barnard's "zone of indifference" or Simon's "area of acceptance" within which the subordinate is willing to accept the decisions made for him by his superior, in return for "inducements."

To an employee of a non-volunteer organization the most obvious personal incentive that the organization offers is a salary or wage. It is a peculiar and important characteristic of his relation with the organization that, in return for this inducement, he offers the organization not a specific service but his undifferentiated time and effort. He places this time and effort at the disposal of those directing the organization, to be used as they see fit.<sup>34</sup>

Taylor a forerunner of Barnard and Simon! This should automatically guarantee him a revival, and it permits us in all decency to exhume the task-and-bonus system from its museum showcase.

Actually, such view should have been expected from a man wedded to the idea of "the one best way" and its implication of continuous improvement in methods. Taylor knew from experience that any cut in piece rates—even because of simplified tasks—made workers resort or revert to deceit.

Now that it has been exhumed, Taylor's plan may prove to be quite fitting for the Age of Automation and the premium it puts on keeping machines in constant operation. On the basis of engineering reports or of work studies, high operating rates could be determined, with high "bonus" for attaining or bettering the "task." But not, as Taylor warned, for producing more.

## CONCLUSION

This review of several of Frederick Winslow Taylor Winslow's thoughts has pointed to (1) the coherence of his "Philosophy of Human Labor" which parallels the main tenets of the Protestant Ethic, and (2) the superficiality of some of the notions held about parts of his system

Charles Péguy, the French poet and philosopher, once observed that "*tout commence en mystique, tout se termine en politique*." Freely translated, it means that great ideas have a way of degenerating into petty techniques. It is to Taylor's credit that he urged administrators not to mistake the mechanism of management for its essence or underlying philosophy.<sup>35</sup> True to Péguy's proph-

<sup>33</sup> House Testimony, pp. 232-33.

<sup>34</sup> Herbert A. Simon, *Administrative Behavior* (2d ed. rev.; New York: The Macmillan Company, 1957), pp. 115-16, 133 ff. See Also Chester I. Barnard, *The Functions of the Executive* (Cambridge: Harvard University Press, 1938), p. 169.

<sup>35</sup> *Principles*, p. 128.



ecy, however, scientific management has stopped far short of the lofty objectives of its father:

Science, not rule of thumb.

Harmony, not discord.

Cooperation, not individualism.

Maximum output, in place of restricted output.

The development of each man to his greatest efficiency and prosperity.<sup>30</sup>

Part of the failure of scientific management must be blamed on hasty misapplications against which Taylor warned. Drucker, however, has pointed to some basic defects in the system itself. Besides, Taylor's vision of man and society fitted his time and his person. Since both are gone, it is useless to try to resuscitate scientific management.

The German philosopher Hegel used the concepts of thesis, antithesis and synthesis to picture the development of conflicting philosophies that finally become reconciled on a higher plane. The time may well have come for a similar integration of the best of two worlds: scientific management and human relations. "Revisionists" such as Drucker and McGregor are already doing just that. And the "ethical viewpoint," after a lengthy eclipse, is now re-appearing in a wealth of articles.

Clearly, Frederick Winslow Taylor, our defunct managerialist twice-removed, remains good for a few great insights.

<sup>30</sup> *Ibid.*, p. 140.



Clay H. Hollister, now engaged in executive recruiting for Ernst and Ernst, in Cleveland, Ohio, writes the following letter and invites the responses of those who may be interested:

"I am faced with a problem that really puzzles me. Much testing and appraising of individuals has been developed over the past 30 years. This testing and appraising has tended to become more objective and more precise.

"Such precision seems to me to be of less than full value since we have no com-

parable set of measuring tools to evaluate the company or the job opportunity. As I see it, we are measuring pegs with micrometer precision but only using a rubber ruler to measure the hole into which the peg is supposed to fit. Two men of substantially equal technical competence may produce widely divergent results in the same company. One "fits"—the other does not.

"Has anyone done any thinking about measuring the company as a place to work? I would very much like to hear what anyone is doing in the peg matching business."

# *A Model of Modern Administrative Organization: The German General Staff*

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Planning, organizing and controlling are three widely accepted organic functions of modern administrative management.<sup>1</sup> These are the management activities that are a major part of the administrative process. With the transition from mercantile capitalism to industrial capitalism during the nineteenth century these organic functions took on a new and vital meaning. The growing size of modern capital enterprise by the middle of that century made it necessary to establish a systematic way to deal with a multitude of technical problems. Vast numbers of people becoming involved in business enterprises necessitated developing procedures to deal with extremely difficult questions of basic organization. These new organizational situations were by nature largely a matter of complex networks of interpersonal relationships.

Two institutions are generally credited with preceding industry in the use of administrative practices as we know and understand their application today. These were the Roman Catholic Church and certain military organizations, especially that of the Prussian army.<sup>2</sup> The contributions of the Catholic Church to organization principles are well known. The modern military use of an advisory staff is usually credited to Gustavus Adolphus of Sweden. But the factors evolving into modern administrative practice began with the Prussian army early in the nineteenth century.

The evolution of the Prussian military system into the German General Staff is an early classical example of the application of the functions of organizing, planning and controlling. The same forces that made possible the growth of these organic functions in Germany for the military were becoming active in business affairs during the later decades of the nineteenth century. Since the military in Germany preceded business organizations in the application of modern administration and management principles, an examination of how these principles developed is useful in the understanding of modern business administrative practices. How did the modern system of management evolve in the military? What did the military contribute to our knowledge of line and staff relationships and the organic functions of management? What forces affected it

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<sup>1</sup> Ralph C. Davis, *Fundamentals of Top Management*, New York, 1951, p. 154.

<sup>2</sup> For a general discussion of these two organizations see James D. Mooney and Alan C. Reiley, *Principles of Organization*, New York, 1939.

both internally and externally? The answers to these questions may help establish a better understanding of the factors at work in a large-scale organization. In an era when business enterprise was beginning to need the same procedures to assure themselves unity and success as the military, the evolution of administrative principles is a vital part of modern business history.

In the period after German unification the Prussian General Staff became the Great German General Staff. Relatively easy and quick victories against Austria and France established the new German armies high in the prestige of the civilian population.<sup>3</sup> And with the unification of the German states (1870's) began the real work of the modern staff. Especially important became the need for detailed plans to deal with real and imagined future threats to German security.<sup>4</sup> Out of the necessity for providing detailed military plans, the General Staff addressed itself during the remainder of the nineteenth century to increasing organizational efficiency. It was from this need for security planning that one of the first examples of modern administrative management actually evolved—an evolution often adopted by businessmen because of their own experiences with the military.

Management problems may be placed in two categories: administrative, and operative. In the early nineteenth century military affairs were usually thought of as operative. Operative meant a series of projects aimed at fulfilling a particular objective. The need for determining the objectives was the other phase of management and was called administration. In Prussia, administrative affairs were delegated to a General Staff whose job was to plan and set up organizations able to provide control techniques to assure success of the plan. The story of how this administrative phase evolved for the German General Staff is classical because of the contribution the Staff made to modern administrative management in commercial and industrial affairs.

The history of Prussia has been one of military growth and power built on a foundation of royal absolutism over a formal army organization dating as early as 1655. It was upon these humble beginnings that the groundwork for a General Staff was laid—groundwork that resulted in the establishment by 1800 of a staff of advisers to the field commander. A young officer, Colonel von Massenbach, in 1801 suggested that the new Staff be organized into three major departments, each charged with operational studies of key strategic areas.<sup>5</sup> The Staff as a whole was charged with preparing war plans against all contingencies. Other activities of the Staff included the holding of regular exercises to familiarize its members with terrain problems and accumulating intelligence regarding foreign conditions. Its members were required to alternate regularly between service with the Staff and service with field units. Actually, very little progress was made in these early years toward establishing a system to do more than develop operational plans. Little thought was given to organizational and control problems.

<sup>3</sup> Gordon Craig, *The Politics of the Prussian Army 1640-1945*, Oxford, 1955, p. 217.

<sup>4</sup> F. E. Whitton, *Moltke*, New York, 1921, p. 305.

<sup>5</sup> Walter Goerlitz, *History of the German General Staff*, New York, 1953, p. 20.

Most military field commanders disliked the staff principle. They feared it would stimulate an independent group who would assume many of the old prerogatives of the field commander. This was later a common complaint from many businessmen and still is a fear of some line managers. Also, it is often expressed by the businessman in much the same terms as it was by the military early in the nineteenth century. The operative man distrusted the recommendations of the administrator because such advice might lead to usurping the prerogative of decision making, with the administrator threatening to assume some of the authority (and rewards) of operative management.<sup>6</sup> If the problem first became evident in the early history of the Prussian General Staff it still has not been completely solved today.

Not until defeat at the hands of Napoleon in 1806 did the Prussians admit the need for a more modern army. But it was to take some of their most distinguished leaders many years to make reorganization a reality. Gerhard Scharnhorst, Carl von Clausewitz and Wilhelm von Gneisenau were to bring reforms in administration to a place whereby the real work of setting up a modern administration of the General Staff could actually proceed under the leadership of Helmuth von Moltke. The main contribution toward effective administration under Scharnhorst, Clausewitz and Gneisenau was to establish a strong Prussian military force built on professional competence rather than noble birth.<sup>7</sup> Out of this a new *esprit de corps* based on technical ability and sound administrative leadership was designed.

By 1813 the General Staff was actively supported by a group of field commanders whose duties were to supply technical information.<sup>8</sup> But there were many years of rivalry and jealousy within the Army before the General Staff came to be recognized by a majority of the operative field men. As in industry and business much of the struggle for acceptance of the General Staff had internal political overtones and was part of a power struggle at the top executive levels. The field commander still had basic fears that a group of technical advisors would finally usurp all decision-making authority. Many years in the future a training system was evolved whereby all command rank officers would be rotated from line operative posts to General Staff administrative jobs. For some reason this system of training transfers never was seriously considered until after the period of German unification. Perhaps it was only natural that an organization such as a staff would not be readily sought out as a place in which to serve. Line operative officials often felt "demoted" when they were promoted to a staff job. Their main complaint even today is that the staff job is dull and not accepted by line operatives.

One of the most important policies of the Prussian General Staff was the insistence by Gneisenau that the staff members leave as much scope as possible for individual initiative at the field level.<sup>9</sup> This freedom to make decisions finally

<sup>6</sup> F. E. Whitton, *Moltke*, New York, 1921, p. 31.

<sup>7</sup> Walter Goerlitz, *History of the German General Staff*, New York, 1953, p. 35.

<sup>8</sup> *Ibid.*, p. 39.

<sup>9</sup> *Ibid.*, p. 41.

became the leading factor in gaining acceptance for the General Staff. But above all, the greatest lesson learned from the early experiences of the Prussian General Staff was the resistance to change that plagued all early efforts of Scharnhorst and Gneisenau. This is also one of the problems that the present day administrators must face in any field—business, the military or government.

By 1816 a military history section was established in the General Staff. The history section was to be important as a training unit. But it was also obvious that the history section was an admission of the need for technical advisory processes. The Prussian military had tactfully admitted the need for such technical assistance long before a need arose in business or other governmental affairs. In the 1820's the War Minister who reported to the King also began to use the General Staff as an advisory organization. This advisory position gained new significance when the King requested that the War Minister go to the General Staff for consultation before deciding a policy issue.<sup>10</sup> In his Prussian logic Clausewitz helped redefine the status of the military in national policy matters and provided a basis for the true modernization of the administrative staff in military affairs. The thesis of Clausewitz was simple: War is not an affair of the military alone, but is also a matter of general governmental policy.<sup>11</sup>

With the army becoming a maker of national policy the need for administrative machinery increased in importance. By late mid-century the era of scientific war had become reality. Alfred Krupp in 1870 was employing ten thousand workers in his Essen ordnance plants. Improvements in railroads, new fast-firing guns, and advancements in the technology of war demanded skilled specialists. The need for the specialists meant a need for the staff officer and a staff organization that could apply the best technical procedures for sound planning, organizing and controlling. There was still much opposition to this elite corps. Security of the officer class could be attacked if the staff idea became too vital to operative success. Obviously a technical staff could not depend on a nobility by appointment of the King but must be a nobility of ability. This meant the rise of a new officer class who could rise to a place of importance by merit and could usurp many prerogatives of the old operative officer class.

The General Staff by mid-century, however, was beginning to win some acceptance as an advisory operation. It was becoming a training department along with its more traditional functions. This was an early step in assuming leadership and establishing the fundamentals of modern administration practices within the army itself. But this last step in its administrative evolution was to be influenced by Helmuth von Moltke. The son of a noble Mecklenburg family, Moltke entered army service as a graduate of the Danish Royal Cadet Corps. He joined the General Staff in the formative years (1833) when it was fighting to gain recognition. By 1858 Moltke had become Chief of Staff and it was under his direction that the real seeds of modern administrative practices were to be planted.

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<sup>10</sup> *Ibid.*, p. 57.

<sup>11</sup> *Ibid.*, p. 62.



Moltke was a man of unusual vision and imagination. What he accomplished for the General Staff must be evaluated more on long range than immediate results. His major contribution was to insist upon the developing of independent action in subordinates.<sup>12</sup> This could be considered the first really modern step toward efficient administrative action. In theory each field commander was also supposed to become a staff officer. At the same time the status of the General Staff was enhanced by the fact that this independence meant a new need to depend on technical assistants for advice. But Moltke did not seem to realize that a good administrator also takes an active and sincere interest in many activities other than his immediate profession. Like its leader the Prussian General Staff could in all justification be tagged as narrow-minded—and overly involved with the technical details of their profession.

Independent action became the key to good administrative practice. At first Staff duties had been largely those of technical advisor. Under Moltke the Staff was assuming all administrative functions rather than those of a mere technical adviser. Their duties would involve not only the various phases of technical planning but the establishment of organizations to carry out the plans. Moltke's main interests were still concerned with basic military planning and especially such technical problems as how railways could be used for quick mobilization. He saw the importance of utilizing *all* technical facilities for army efficiency. This alone made the task of Staff organization more general in character. With the Staff now committed to training and advisory functions, planning was only one phase of all operative needs.<sup>13</sup> Planning was a recognized part of the service of war and could no longer be a process of field command guess-work or speculation. It was truly an organic function of the business of making war. Moltke recognized this and spent much effort in building an efficient war planning group. This highly organized and well thought out planning organization was one of the very first of its kind in modern management history. And it certainly has proved an excellent pilot study for modern business planning techniques. Even today the operations research techniques of gaming theory have evolved from the early days when toy soldiers were moved around a sand box to try out in three dimensions a theoretical plan. Model building and graphic presentation were other planning methods evolving at least in part from General Staff ideas.

The Staff had little or no real voice concerning organization and control of administrative procedure. This was still a matter to be decided on by local field commanders. The field commander looked to the Staff for advice but the Staff received no reports on military actions from the operative units. No administrative unit can really come into existence until it can command technical control over operative procedures and a definite voice in the solving of organizational problems.<sup>14</sup>

As it became clear during the Danish campaign of 1864 that the General Staff would be needed to assure efficiency in carrying out plans, a new directive

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<sup>12</sup> *Ibid.*, p. 75.

<sup>13</sup> *Ibid.*, p. 79.

<sup>14</sup> *Ibid.*, p. 84.

was issued in 1866 by the King of Prussia. This stated that the Chief of the General Staff was permitted to issue operational orders to carry out plans.<sup>15</sup> Moltke had fought for this freedom of action against custom and traditions of many generations. For the first time all the organic functions of administration were under one administrative policy making unit. This meant that the functions of planning, organizing and controlling were now the prerogative of the technically trained policy making group. Operative managers were freed from making decisions in a vacuum that locally might be wise but could upset an over-all scheme. The Staff now had evolved into much more than an advisory group. It had become the chief administrative officer because it had final authority over the organization and control functions.

This had become clearly defined for the Great Prussian General Staff several years before the actual political unification of Germany. Many years would pass before most business firms realized the significance of making a clear definition between operative and administrative management. In some cases the definition is still not clear and operative management jealously holds to a prerogative it has not justified. With full administrative power residing in one well-trained highly efficient organization, decision making on a policy level became efficient to the point that operative thinking could now be based on a common storehouse of knowledge. Resulting from the new organization were flexibility and creativity. So the very essence of good administration became the ability to move from thinking in terms of mere staff jobs to becoming schooled in terms of the true job of the administrator—that is, the coordination of *all* operative functions to assure uniform results in any particular action situation.

The term Staff may lead to confusion. Staff duties do not by definition mean administrative functions. However, in the final sense of evolution the administrative policy-making group actually performs most of the technical functions of an advisory nature. This is seldom clear in American business affairs because most company officials try to separate staff and operative functions. The real point of difference is between policy making (which includes staff advisers) and the operative functions. The old terms line and staff are not suited to a clear definition. Also it is vital to realize that the organic functions of a business (production, sales and finance) often differ from those of the military. Although both use the same organic management tools of planning, organizing and controlling, they have different end objectives. This, however, has no real effect on the fact that administrative and operative functions must work as a unit to assure the most efficient results.

The General Staff in Germany increased from 64 to 135 from 1857 to 1871 and continued to grow under Moltke's leadership. This is common in most administrative situations.<sup>16</sup> But as administrative authority grew the size of the staff began to increase in direct proportion. Roughly it might be said that the size of the Staff was in direct proportion to the increased scope of its adminis-

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<sup>15</sup> *Ibid.*, p. 86.

<sup>16</sup> *Ibid.*, p. 96.

trative activities. By 1888 the Staff numbered 239. Of these, 197 belonged to the Prussian branch of the greater German Army.

In the seventh and eighth decades of the nineteenth century the reputation of the Staff grew to the point at which it was advising army administrators from Japan and Turkey. Other nations (such as Italy) were beginning to construct staffs on the same basis as Germany. The administrative process and the recognition of a need for planners who could also order the carrying out of plans were not integrated functions of an efficient organization.<sup>17</sup>

The Great German General Staff did not come into being overnight. Its evolution took generations of the most careful diplomacy lest the staff so alienate the operative line that it destroy itself. The recognition of the need for applying new administrative tools to an era of modern warfare accelerated the growth of the staff. Resistance to change, however, made the growth far from easy. But the real significance of what happened to the Great German General Staff lies in the fact that it set a pattern for the administrative organization of *big* business. The Staff was one of the first examples of the application of modern administrative functions to the management of a large organization.

<sup>17</sup> *Ibid.*, p. 97.



## *Forthcoming Meetings*

**Institute on Electronics in Management**, sponsored by The American University, October 30—November 3, 1961, at The American University, Washington, D.C. Prof. Lowell H. Hattery, Director, Center for Technology and Administration, The American University, 1901 F Street, N.W., Washington 6, D.C.

**TIMS-ORSA 2nd National Meeting**, November 8-11, 1961, at San Francisco, California (Jack Tar Hotel). The Institute of Management Sciences, Box 273, Pleasantville, New York.

**1961 Eastern Joint Computer Conference**, December 12-14, 1961, at Washington, D. C. (Sheraton-Park Hotel). Theme: Computers—Key to Total Systems Control. Papers: Business Management Control, Military and Space Command Control Systems, Industrial Process Control, Real Time Systems, Network Control, Man-Machine Systems, Self Organizing Systems, High Speed Digital Data Communications. Bruce C. Oldfield, IBM Federal Systems Division, 326 E. Montgomery Avenue, Rockville, Maryland.

**Association for Computing Machinery National Conference**, September 5-8, 1961, at Los Angeles, California (Statler-Hilton Hotel). A. C. M. 1961 National Conference, Ben Handy, Litton Systems, 5500 Canoga Avenue, Woodland Hills, California.

**NABAC National Convention (The Association for Bank Audit, Control, and Operation)**. September 11-13, 1961, at Chicago, Illinois. NABAC, 38 South Dearborn Street, Chicago 3, Illinois.

**International Systems Meeting**, October 8-11, 1961, at Cleveland, Ohio (Hotel Statler and Hotel Pick-Carter), "Systems Management in Transition." Systems and Procedures Association, 817 Penobscot Building, Detroit 26, Michigan.

**Computer Applications Symposium**, sponsored by Armour Research Foundation, October 24, 25, 1961, at Chicago, Illinois (Terrace Casino, Morrison Hotel). Robert B. Brausch, Armour Research Foundation, 10 West 35th Street, Chicago 16, Illinois.



# *Military Management and the General Staff*

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In the literature on management, one frequently finds descriptions of the Army General Staff, as well as pleas that business firms should adapt their organization structures to this type of line and staff organization. Quite often one also encounters the point of view that military departments have done a much better job of organization than firms operating in the competitive environment of the business world. The purpose of this paper is to describe the changes that have occurred in recent years in the general staff organization of the Department of the Army, in response to the unique pressures generated by the "cold war." The reason for choosing the Department of the Army rather than one of the other military departments is that the general staff concept is more fully developed in the Army than in the Navy or the Air Force. As a matter of fact, the Navy has operated for many years, and has won many battles, without the all-pervasive general staff-special staff concept that one finds at virtually every echelon of the Army.

## THE GENERAL STAFF AT THE DEPARTMENT LEVEL

In order to avoid complications, the discussion of the general staff at the Department of the Army level will be simplified to a considerable extent. Reporting to the Chief of Staff under the traditional General Staff concept were the four G's. These consisted of the Deputy Chief of Staff for Personnel (G1), Deputy Chief of Staff for Intelligence (G2), Deputy Chief of Staff for Operations (G3), and the Deputy Chief of Staff for Logistics (G4). This structure was repeated at lower levels of the organization with minor changes in nomenclature.

In recent years, largely because of the impact of the cold war and the acceleration of technological change, a number of important changes in the general staff concept have occurred at the Department of the Army level. These changes in the structure of the general staff are noteworthy in several respects. The general staff, as the writer has pointed out in previous studies,<sup>1</sup> is an ideal structure when the military organization is engaged in combat with the enemy

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<sup>1</sup>Waino W. Suojanen, "The Span of Control—Fact or Fable," *Advanced Management*, November, 1955, pp. 5-13, and Waino W. Suojanen, "Is Military Organization Really Better?", *Advanced Management*, September, 1958, pp. 10-15.

or in the planning of military operations. Variations of the general staff concept are also very useful when planning for joint operations where more than one service may be involved or in combined operations which include the armed forces of more than one country.

However, the traditional general staff concept has not proved adaptable to the administrative requirements of a continuing period of watching and waiting conflict of the kind that has characterized the international scene since the end of World War II. One reason is that the traditional general staff concept was created to fill the needs of command rather than of management; and management in the present-day military organization assumes increasing importance as a result of the problems created by the need for cold war alertness.

In recent years, the organization of the Army Staff has tended to resemble more and more the functional structure of the business corporation and less and less that of a "commanding machine." As an example, the G2 (Intelligence) function is extremely important at the strategic and tactical levels of the military organization. However, in line with present doctrine at the Department of the Army level, G2 does not possess primary functional responsibility simply because there are no significant management functions to be performed in the intelligence area in the present environment. This is also true at lower levels of the Army organization. This is not to disparage the importance of intelligence but rather to point out that this particular function has primary meaning only in certain types of military situations.

In the present organization of the Department of the Army, the Comptroller of the Army and the Chief of Research and Development occupy positions at the Deputy Chief of Staff level. Significantly, both of these positions have been created as a result of cold war requirements. At this level, they possess primary functional responsibility for program management as contrasted to the Assistant Chief of Staff for Intelligence who has no such primary program management responsibility. To put it differently, the head of the G2 function presently occupies a position within the Army Staff at a level comparable to that of the Assistant Chief of Staff for Reserve Components.

To summarize, within the Army Staff the Chief of Staff has five deputies reporting to him. These five are the Comptroller of the Army, the Deputy Chief of Staff for Military Operations (G3), the Chief of Research and Development, the Deputy Chief of Staff for Personnel (G1), and the Deputy Chief of Staff for Logistics (G4). To an increasing extent each of them performs independent functions comparable to those found in industrial corporations, such as production, marketing, finance, personnel, and research and development, rather than serving as a link in the more traditional "commanding machine" concept of the general staff. The reasons for these changes in the character of the general staff are explored in more detail in the following discussion.

### MILITARY PLANNING

Command management in the Army is directly derived from the basic national security policy. The formal agency through which much of this policy

is developed is the National Security Council. The military aspects of the basic national security policy are formulated by the Joint Chiefs of Staff in their role as the Chief military advisers to the Secretary of Defense and the President.

Joint War Plans, prepared by the Joint Chiefs of Staff, indicate the broad tasks that each of the services will be required to perform in the event of mobilization. These plans consist of the Short-Range Strategic Capabilities Plan (emergency war plan); the Joint Strategic Objectives Plan (intermediate war plan); and the Joint Long-Range Strategic Estimate (long-range war plan). Each of these plans is comparable to the various plans prepared by large corporations. The emergency war plan is analogous to the operating budget; the intermediate plan is very closely related to the capital budget; and the long-range plan is similar to the long-range plans that increasingly large numbers of commercial organizations now prepare and use as guides.

Each of the military plans is based on estimated positions at varying points in time in the future. The short-range war plan develops the strategy to be employed in the event of a war to be fought in the main with currently available resources. The long-range plan is less concerned with capability estimates and more with the shape of national security objectives and policies which are predicted as being governing eight to twelve years in the future.

Neither the short-range plan nor the long-range plan assumes the degree of significance in program planning (which will be discussed in the next section) as does the mid-range plan. The extended positions in the long-range plan are too distant and the assumptions that must be made are too speculative to warrant the investment of resources. On the other hand, the short-range plan, like the operating budget of a commercial firm, is concerned with the present situation—it is more of a guide for tactical commanders than a plan for the future.

The mid-range plan, in contrast to the other two, covers a period of a war of three years' duration to be fought four years from now. This interval is convenient in relation to the procurement lead times of major items of equipment, budget cycles, technological advances, and the predictability of future events. It is not theoretical in nature—rather it is possible of achievement under a definite financial plan and within the constraints of current technological knowledge. It may, therefore, be considered as the goal or objective toward which all current military programs are focused. The mid-range plan, therefore, becomes the basic document which guides the development, execution and review of the operations of each year.

### THE IMPACT OF THE COLD WAR

The costs of providing for the national security of the United States continue to mount year by year. Since 1955, for example, national security expenditures have averaged roughly ten percent of the Gross National Product. By way of contrast, defense spending during the decade of the thirties averaged only about one percent of a much smaller GNP.

A number of factors have contributed to this pyramiding of national security expenditures. Inflation has increased the costs of procuring and producing the

weapons that are required and has also had a considerable impact on the amount of resources required for military pay and allowances. The cost of world-wide commitments is much more expensive than the support of an Army and Navy which were based mainly within the continental United States during the pre-World War II years.

Of greatest significance, however, has been the impact of technology on range and depth of weapons systems which are now required to support the national policy. The rapid progress in military technology has not only been responsible for increasing the cost and complexity of weapons systems—it has also resulted an acceleration in the rate at which these systems become obsolescent. As a result of the progress in military technology, a number of new developments are undertaken each year and this has caused a tremendous increase in funds devoted to research, development, test and evaluation.

It is clear that considerations of national security cannot and must not be divorced from the fact that the resources available for this purpose are limited. Optimum military effectiveness is achievable only if all of the available techniques of improved management are employed at every level of the military organization. Increased efficiency and unremitting economy must be practiced in all areas of military operations if we, as a nation, are to maintain and improve our capabilities over time.

To cope with these problems, the Department of the Army has developed the Army Command Management System, popularly known as ACMS. This system provides for effective and continuous coordination of programming, budgeting, accounting, and manpower and material management at all levels of command. ACMS, in other words, provides the means by which all of the aspects of Army management are integrated.

### THE ARMY CONTROL PROGRAMS

The Army Command Management System, at the departmental level, is broken down into the five control programs listed below. The general staff section responsible for each program is also indicated.

<i>Control Program</i>	<i>Primary General Staff Responsibility</i>
Troop .....	Deputy Chief of Staff for Personnel
Installation .....	Deputy Chief of Staff for Logistics
Material .....	Deputy Chief of Staff for Logistics
Reserve Components .....	Assistant Chief of Staff for Reserve Components
Research and Development .....	Chief of Research and Development

Each of the Department of the Army staff agencies listed above has definite responsibilities for the control programs assigned to it. These responsibilities include:

- (1) *Development and annual revision of time-phased quantitative objectives for the control program.*
- (2) *Periodic reporting on the status and projection of accomplishment of control program objectives.*

- (3) *Review of performance* in relation to the objectives of the control programs.
- (4) *Appropriate action to insure accomplishment* of control program objectives.

To understand the content of the control programs, the Installations program which is one of the programs under the responsibility of the Deputy Chief of Staff for Logistics, requires that he:

- (1) Establish objectives and guidance for the construction, acquisition, maintenance, utilization, and disposal of Army real property.
- (2) Establish facilities requirements to satisfy the Active Army and mobilization reserve needs; indicate permanent installations.
- (3) Provide guidance for utilization of installations.
- (4) Specify activations, inactivations, and relocations.
- (5) Furnish specific objectives for the acquisition of real estate and construction of facilities.
- (6) Establish standards and priorities for the maintenance, replacement, and disposal of Army real property.

### ARMY OPERATING PROGRAMS

Every command, agency and installation which receives funds prepares an annual operating program to cover its non-tactical or peacetime activities. Each of these operating programs must be in consonance with the overall guidance and objectives of the five control programs described in the previous section. In a broad sense, therefore, if all of the operating programs were to be aggregated, the total would add up to the plan for accomplishing the mission of the Army within the guidance furnished by the mid-range plan.

The fundamental purposes of each operating program are threefold:

- (1) The operating program records in one place the activities to be conducted as well as the resources necessary for their support in order to achieve both the objectives assigned by higher authority and those assigned by the commander. Resources include men, money, material, and facilities—everything necessary to accomplish the assigned mission.
- (2) The operating program identifies that portion of the plan of action to be accomplished by each subordinate echelon and element based upon objective, policies, priorities, and the availability of resources.
- (3) The operating program establishes the standard against which actual performance and resource utilization are measured.

Each operating program consists of a basic document, the necessary schedules, and an operating budget. The basic document develops the guidance for the command as a whole as well as for each subordinate element. The schedules indicate quantitatively how the specific annual objectives are to be achieved. The operating budget sets forth the funds required to carry out the operating program. It is a detailed installation resource management plan indicating the funds which will be required to carry out the operating program.

At the departmental level, the aggregated operating budgets form the basis for requesting funds from the Department of Defense and the Bureau of the Budget. The amounts made available in turn become the basis for establishing or revising funding programs and for the distribution of funds to major commands and operating agencies.



### COMMAND MANAGEMENT AT THE OPERATING LEVEL

The installation in the Army is the establishment comparable to the plant or factory in the manufacturing firm. At this level, policies, objectives and missions are translated into actual accomplishment. To get things done at this, as at any organizational level, requires the planned and controlled utilization of resources.

The operation of the Army Command Management System at one installation, which is typical, is described below in broad outline:

At Installation X, the Program Budget Advisory Committee (PBAC) is composed of senior representatives from the General Staff who are responsible to the Commanding General for *developing, reviewing, and making recommendations* to the Commanding General on all matters pertaining to the operations of the command. The Chief of Staff is the chairman of the PBAC, the active voting members are the G1, (Personnel); the G3, (Operations); and the G4 (Logistics). The installation Comptroller sits on the PBAC as an advisor only—not as a voting member. Finally, the Deputy Chief of Staff, who is referred to as a Program Coordinator, sits in on the meetings of the PBAC at this particular installation as an advisory, non-voting member.

### IMPACT ON THE GENERAL STAFF CONCEPT

The Army Command Management System has had an interesting impact on the structure and method of operations of the general staff down to, and including, the installation level. This is important because, to an increasing extent, the general staff, under ACMS, cannot be considered as a "commanding machine" of the kind discussed in the literature.<sup>2</sup> Rather, as suggested earlier, the members of the general staff in the kind of conflict we are engaged in at the present, increasingly assume those duties and responsibilities which are more characteristic of business organizations.

This is due to the fact the general staff device is hardly appropriate for the administrative requirements of command management because it was created to fill the needs of command rather than the requirements of management. Therefore, over the course of time, the general staff structure has tended more and more to resemble the organization of industry. The reasons for this are evident in the requirements for the management of the routinely-oriented organization.

In preceding paragraphs, the words *development, revision, review of performance, and appropriate action to insure accomplishment* were underlined. The terms *developing, reviewing, and making recommendations* were similarly emphasized. Under ACMS, these responsibilities are those of the General Staff. It is clear that these are line rather than staff responsibilities and they are intended as such in the applicable Army Regulations and Field Manuals. The author has observed the Army Command Management System in operation from the installation level upward through the major command and the Department of the Army and the duties performed under it are remarkably similar to line

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<sup>2</sup>Lyndall F. Urwick, "The Manager's Span of Control," *Harvard Business Review*, May-June, 1956, p. 46; and John D. Stanley, "The General Staff; An Analysis of Its Effectiveness," *Journal of the Academy of Management*, April, 1959, p. 62.



functions in industry and quite different from staff functions in commercial enterprise.

The present situation is one of continuing, watching and waiting conflict. The advent of ACMS has coincided with the period that has seen the shift from the use of force to the deterrence of violence in the military. As a result, the general staff officer has to possess a much greater understanding of broad social, political, economic and management policies and problems.

Unfortunately, the system of advanced education and job rotation through which general staff officers are educated is still concerned primarily with the development of tacticians rather than well-rounded managers. Therefore, the results of ACMS have quite frequently been somewhat less than expected.

The scarcity of managerially educated general staff officers in the traditional G sections has thrown more than a legitimate share of the administrative burden under ACMS on the Comptroller. This has been coupled with a certain feeling of resentment that the "bookkeepers" are running the Army and that the tactician is now in the back seat. This type of atmosphere has not been conducive to a wholehearted acceptance of ACMS, particularly by personnel at lower echelons.

In many instances, the scarcity of managerially educated general staff officers has been aggravated by a shortage of qualified civilian personnel. This shortage of civilian personnel is partly due to the reluctance of many highly qualified professionals to work for a military superior. It is also partly due to the inability or the unwillingness of the military to follow the most advanced personnel practices, as well as to the relatively low salary scales in the Federal civil service. Frequently, the salaries paid key civilians are less than half that of comparable jobs in private industry. Obviously a long-run, integrated management program such as ACMS can hardly be expected to live up to its promise under conditions of this kind.

The Army continues to insist the positions be filled by military personnel in many instances where qualified civilians could frequently do a better job within the ACMS framework. The general staff officer who lacks sound management education and experience, and who is in a position of authority, frequently tends to rely on rank, power and position in the making of decisions. In those cases where he is antagonistic toward a management job because of his tactically-oriented value system, the difficulty is compounded. Although this is another story, it does indicate that the traditional general staff environment does not necessarily create officers with a well integrated management orientation.

### CONCLUSIONS

1. A continuing war of deterrence is costly in terms of resources and therefore requires the application of the best possible management skills and methods.
2. The Army Command Management System represents the approach of one military department of the administrative requirements of watching and waiting warfare.
3. The Department of the Army has discovered that the traditional general

staff organization, with its action-oriented outlook, has required radical revision to cope with the problems of management arising from the needs of the cold war.

4. Over the course of the past decade, the evolution of General Staff organization has tended to approach that of the line structure of private industry.

5. The line structure of commercial enterprise requires well trained, quality managers just as is the case in the line structure of the tactical military organization.

6. As a result of attempts to modify the General Staff structure to meet management requirements, efficiency, economy and effectiveness have not been attained to the degree possible or desirable.

7. In view of the fact that the General Staff concept has required extensive modification to meet the needs of a routine-oriented, management type of conflict, the question is posed whether the recurring suggestions that business adopt this device might not be completely missing the point.<sup>3</sup> This point, of course, is that the General Staff approach to organization, which is appropriate and perhaps even necessary to the requirements of an action-oriented situation, is inadequate for the needs of a routine-oriented, administrative operation.

8. In those cases where commercial firms have adopted a variant of the military general staff concept within their structures, the introduction of the device is probably more due to the influence of a retired general turned policy maker than to any intrinsic strength it possesses over the much more commonly employed functional type of organization.

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<sup>3</sup> John D. Stanley, *Ibid.*

# *An Inquiry into the American System of Industrial Management*

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American corporations constitute a unique form of industrial government. Their managers are made up of groups of people whose decisions shape the allocation and use of America's resources. They act in a pluralistic economy where it is assumed that they are subject to no particular national plan except in cases of dire national emergencies. To some extent their freedom to act is circumscribed by a political government, but part of their residual skill consists in preserving maximum freedom to act in a democratic society and maintain political acceptability therein. What are the sets of principles that influence their decisions? We are, of course, referring to general management.

The function performed by the generalist in management includes that of containing within one system all of the functional specialists: for example, the marketing man who wants to promise today's orders for tomorrow's delivery, the production man who wants to lump all orders to fit a minimum cost production pattern irrespective of the delivery requirements, the financial man who is interested in minimizing investment costs and the plant engineer who is anxious to buy the latest automated equipment. In addition he must understand how to maintain political acceptability in a democratic society.

The President's Commission on National Goals agrees that we must maintain a substantial growth in productivity.<sup>1</sup> Its members split on whether the goal should be 3.4% or 4% or 5%. How does the management at the micro-decision level tie in with a national objective of sustained economic growth at the macro-level—or are these national objectives just meaningless rhetoric? We rely for the allocation of our national resources upon the decisions of a decentralized system of autonomous institutions, the business corporations. Are they in any way directed by a sense of national purpose?

Businessmen talk about management as a profession. They talk of management as trustees on behalf of stockholders, laborers, customers, distributors, suppliers and the public at large; that is, some of the time. Is there a set of principles that governs these decisions? The textbooks say yes and attempt to outline and describe a set of precepts.

Business men talk one way in their idealistic moments and a different way in the conversation at their clubs. On some occasions, at university commencements for example, the fundamental guiding precepts of the emerging profes-

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<sup>1</sup> *New York Times*, November 28, 1960, pp. 21, 22.

sion of business are extolled. On more cynical occasions, managers themselves will denigrate the study of management and talk of purely intuitive instincts. They describe steering the enterprise by the seat of their pants.

Which of these two pictures describes reality? Is the businessman merely catering to a public relations need when he talks in terms of the professional requirements of business at the top level or is he indulging a pseudo-cynicism when he both glorifies and derides his function simultaneously?

Robert Gordon asked some of these questions and came to inconclusive answers. His book *Business Leadership in the Large Corporation*<sup>2</sup> was based upon his observations of business behavior during the 1930's. He stated then that "despite the mounting literature on corporate management, we still know surprisingly little about how and by whom in the large corporation prices are set, investment decisions are made, key executives and directors are chosen." Since the publication of the Gordon book, we have seen the explosive growth of the large corporation, first in its adaptation to the post-war economy and then its integration into a cold-war economy.

The system of decentralized decision-making which it represents is both defended and attacked from many quarters. The challenge from industrial systems abroad is obvious. Within the country itself, influential voices, like Galbraith,<sup>3</sup> have raised questions whether or not the allocation of resources should continue to be left to what is implied to be an irresponsible management. Galbraith's attack is a continuation of the assault of other intellectuals upon the basic competence of management to be trusted with the allocation of resources. The very same questions are raised by Arthur Schlesinger, Jr.<sup>4</sup>

On the other hand, other academic observers like Adolf Berle<sup>5</sup> have talked about the growing sense of trusteeship of the corporation and the growth of what he calls the corporate conscience. All of this, however, has been in the realm of speculation with an occasional example to fortify an intuitive insight. What is needed is a comprehensive look at what is actually happening.

If private decentralized management is to rise to these attacks, it must begin with a careful examination of what is taking place at the corporate level. We may well begin with an examination of the internal structure of function.

Four complimentary approaches to general management receive emphasis. They are:

- (1) The presentation of management as a set of self-contained, abstract, functional principles such as planning, organization control, etc.
- (2) The presentation of clinical cases and problems without any attempt to distill an abstract set of principles. It relies upon the indoctrination of a set of miscellaneous intuitive artistic insights.

<sup>2</sup> Gordon, Robert, *Business Leadership in the Large Corporation*. The Brookings Institution, Washington, D.C., 1945, p. 12. (Recently reprinted in a paperback edition by the University of California Press.)

<sup>3</sup> Galbraith, John, *The Affluent Society*, Boston, Houghton-Mifflin Co., 1958.

<sup>4</sup> Schlesinger, Arthur M. Jr., *The Vital Center*, Boston, Houghton-Mifflin Company, 1949.

<sup>5</sup> Berle, Adolf, *20th Century Capitalism; Power Without Property*, New York, Harcourt, Brace and Company, 1959.

(3) The treatment of management as an application of insights from the behavioral disciplines such as anthropology, psychology, sociology, etc.

(4) The structuring of mathematical and simulation models first as a specialized functional tool of general management and then an extension as a completely self-contained system.

An analysis of each of these exclusive approaches indicates a combination of virtues and limitations.

The presentation of management as a set of self-contained abstract principles employs the method of logical sequence. The observer is able to organize his thinking around a set of rules and principles that will guide his organizational behavior. This is the original method evolved by the pioneer management thinkers, beginning with Taylor's publication of *Shop Management*, and *Principles of Scientific Management*.

Its limitations are that the observer without a background of experience upon which to draw comes away with a skeleton upon which he is unable to hang concrete data. Confinement to this approach alone runs the risk of steeping the observer in meaningless platitudes.

The case method has the virtue of bringing before the observer a plethora of data and business events that fill the void of the observer's inexperience. On the other hand, the case method leaves the observer's capacity for abstraction relatively unsatisfied. His cases become a set of disconnected models which he tries on the future reality that he faces like so many beds of Procrustes. Each case is unique and therefore we may assume that there are no principles of general management.

The treatment of management as a set of applications of the insights from the behavioral disciplines such as anthropology, psychology, sociology, etc., has the virtue that it breaks out of the superficialities and blind alleys into which management was led by the indiscriminate human relations enthusiasm. It seeks to bring the rigor of its research tools into the business environment and substitute them for the anecdote and homily.

However, an exclusive preoccupation with the behavioral studies tends to displace the focus of the observer. He must remain a student of the business clinic rather than seek to abstract data from the clinic which will fit the intellectual model of the behavioral specialist.

The mathematical approach to management confined itself for some time to the refinement of the functional specialties. For example, the use of mathematics has revolutionized inventory control and the routing, scheduling and dispatching of work. These applications of mathematics are refinements of older rule-of-thumb methods.

Another group of men are convinced that the computer is a creative device that will make, eventually, the entire hierarchy of business decisions. A business corporation will be portrayed as a huge mathematical model. Copernican-like breakthroughs are announced for the future. To what extent does this philosophy find any possibility of realism in the present business climate?

The management generalist starts with the business institution itself as the basis of his conceptual scheme and attempts to build his theory systematically with the institution itself as the basic point of departure in a *systems* analysis.

This means that the study of general management must consist both of a descriptive clinical phase and complex analytic phase. The management generalist cannot permit himself the luxury of complex analytic mathematical models built upon a few "self-evident propositions." He must carefully investigate and describe the different models that have been evolved out of experience and fit them into a conceptual scheme. The artificial distinction between analytic and descriptive methodology is rejected by him. He cannot analyze in a vacuum and his field is replete with rich clinical material. What is needed is a detailed clinical study of operating management to consist of:

- a. An examination of the nature of the governing process of private enterprise to determine the criteria for business decisions.
- b. Identification of the criteria and mechanisms to coordinate decisions and their associated implementing activities.
- c. Analysis of the process of accommodation of the managerial decisions within the firm and with other institutions in the larger society.
- d. The impact of the corporation on the private life of the participants in the corporate executive structure.

To be sure there is no paucity of writings on the subject of general management. The problem is to correlate what is written with what actually takes place. Frank Gilbreth had observed that workmen use a number of different methods when they work at their jobs without being aware of the difference. They pursue one method when they work and still another when they teach. Is the same true about members of management? Do they act one way when they operate and another way when they describe what they are doing?

Can all of management be encompassed within a single model? A common complaint is that management principles express non-operational platitudes. An old epigram says that what is everybody's property is nobody's property. Principles designed to explain all managerial behavior ranging from the operation of a small retail establishment to the operation of a gigantic multi-industry organization really explains nothing. Is not the time ripe for a new approach? Has it become necessary to develop a number of functional types of management which will describe the different behaviors that arise under different sets of circumstances? Can a series of categories be defined with the accent on differences rather than sameness that will achieve for management the same kind of useful conceptual pattern that Professor Hoxie developed to explain differences among trade unions? It is indeed strange that the trade union movement, a secondary response to managerial initiative, has received much deeper theoretical treatment to explain differences in behavior than management, the central institution of any industrial society.

These questions arise in educational circles and great debates are carried on over what constitutes a proper education in management. This debate can only begin to get rational answers when it is disclosed what actually happens at the



management levels in the corporation. What is needed is first hand observation within a systematic frame of reference. There is no shortage of homilies on managerial principles. There is no shortage of case histories recorded in splendid isolation. There is no shortage of proposed mathematical models. What is missing is the integration of all of these materials and a comparison of their implications with clinical reality.

How real are the concepts of organizing, planning and control as described in typical textbooks? To what extent are the new sophisticated techniques the playtoys of an intellectual staff that serve the prestige needs of the corporation vs. actual generators of decisions?

### METHODS OF APPROACH

The following research approach is outlined more to suggest a beginning than to delineate a final plan. Extensive changes in the methodology outlined below may arise in the course of the pursuit of the investigation.

The focus of attention would be a number of key decisions in the area of planning, controlling and organizing. We would try to concentrate on decisions that were five years old or more to minimize the impact of any current emotional trauma on the participants. Interviews would be scheduled with the top executive officer of about twenty key corporations. An attempt would be made to solicit aid in identifying a number of key decisions arrived at after staff recommendations. We would particularly concentrate on those decisions that arose out of conflicting subordinate recommendations. An attempt would be made to isolate those factors that entered into the thinking of the chief executive as he made his selection from a number of alternative contradictory recommendations from his staff and subordinate officers. An attempt would be made by a means of depth interviews with the top executive and his staff and subordinate officers to determine what happened. Reviews of the available minutes of any of the meetings that were held in the course of estimating this policy would likewise be undertaken.

A hypothesis would be that the data collected would support a functional classification for management similar in form to the equivalent functional classification developed by Hoxie for unions. Hoxie found unionism to be not a single social movement but an imperfect fusion of several, no one of which could be adequately accounted for in purely economic terms. His analysis of unionism was characterized by emphasis upon function, the distinction of fundamental types, and a pluralistic causal interpretation. The types listed by Hoxie follow:

*Business unionism*—its outlook is that of the craft or trade, its aims are narrowly economic. Its principal purpose is collective bargaining.

*Uplift unionism* accepts the existing social order. Its mission is the diffusion of leisure class culture and bourgeois virtues among the workers. Mutual insurance is its main function and homiletics its preoccupation. A typical example is the now defunct women's trade union league.

*Revolutionary unionism* avowedly aims at the revolutionary overthrow of

the existing social order. It is divided into the socialistic and quasi-anarchistic elements.

*Predatory unionism* practices secret rather than open violence. It is lawless but it professes no far-reaching philosophy. It aims at nothing but the immediate advantage of its own membership.

*Hold-up unionism*—its most brilliant successes come from illicit alliances with employers to organize joint monopolies.

*Dependent unionism* where the union is dependent upon others for its basic strength.

*Company unionism* or office workers' unions in union offices represent an example of this class.

Just as the trade unions fall into these categories it is anticipated that managements will fall into types. Cutting through all types and influencing their development will be the following influences:

(1) The socio-cultural factor of the environment from which the owners are drawn, as against the managers in a specific legal environment.

(2) The influence of firm size and technology upon the behavior of the management.

(3) The characteristic of the industry and technology that lead to dominance by some one functional group, e.g., is the management finance-influenced, production-oriented; or sales-dominated principally? An interesting question is, how did this initial picture continue after the basic cause leading to its dominance ceased?

It is our hope that we shall be able to develop a variety of functional types of management that will be as fruitful in explaining and predicting managerial behavior as was Hoxie in explaining trade union behavior.

# *The Development of the Teaching of Management in the School of Business*

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This article deals with (1) the relationship between the development of engineering and scientific management, (2) the original ideas of the founders of the early colleges of business who did not conceive of the need for specific and separate teaching of management, (3) the introduction of scientific management into the school of business, and (4) the more recent broadening of management offerings. It concludes that the scientific management aspects of manufacturing management do not appear to belong in the school of business and that to justify itself management must be in the university tradition.

## I

Sometimes a consideration of the academic background and of the development of the teaching of a field of study provides a fruitful means of suggesting matters which deserve further thought. This might very well have been true, for example, in connection with engineering some years ago. The impetus given that field by the passage of the Morrill Land-Grant Act of 1862, together with the establishment of the technical institutes, was followed by unanticipated results. Before that time elements of engineering had been taught at a limited number of colleges in what little university tradition there was in the United States.<sup>1</sup> Henceforth, however, developments tended to be virtually altogether outside that tradition. With the elaboration of civil, electrical, and mechanical engineering curricula designed essentially to prepare technicians, all engineering offerings were drawn into the same pattern, so that eventually the technical course requirements in engineering became so extensive as virtually to preempt the entire curricula except for such basic courses as English. It was not until relatively recent years that emphasis was finally placed on the desirability of broadening the requirements to include the humanities and social sciences. These fields were in some instances then introduced into the curricula for the first time. At present there is also a tendency toward orientation in the direction of science.

Although a survey of the development of the study and teaching of management scarcely resembles the developments in engineering, there appears to be some

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<sup>1</sup> Civil engineering as an outgrowth of military engineering was offered as early as 1820 by a private military academy which was apparently influenced in part by developments in France under Napoleon, who frowned on liberal studies, and which in turn influenced the concept of the land-grant college.

relationship between the two. Management was from the beginning and for some time thereafter not in the academic tradition. It was therefore not subject to the leavening process at work in the university environment, which was beginning to take firmer shape in the United States at just about the same time that both the expanding technical curricula and the management movement were getting under way. Although the American college had been more like an academy or prep school than an English university which maintained faculty rule, and although the professors were viewed as advanced pedagogues with small respect, the stimulus for founding advanced institutions offering graduate work came from leaders returning from Germany after 1870.<sup>2</sup> The creation of the universities and the strengthening of many colleges brought in new types of professors trained as research workers accustomed to thinking for themselves. A professional academic point of view in the university tradition began to take firmer root. In the meantime, management, which was from the first widely promoted among engineers whose own backgrounds were increasingly outside the university tradition, was itself outside that tradition.

While it can be shown that management ideas have a long history and that some of Frederick W. Taylor's views had been anticipated by others,<sup>3</sup> he is nevertheless acknowledged not only to have developed a systematic approach to the field, but also to have so successfully publicized his thinking as to be considered among the leaders of the scientific management movement. In his objective of setting standards of performance, he placed incidental stress on the individual and on successful human relations, even though he did not emphasize such features as informal group relationships which took on significance for later observers. However, such efforts as he made to call attention to matters beyond the setting of standards, particularly with the stop watch, did not succeed in influencing his engineering audiences. For the engineers, time and motion study, together with the objective of discovering a satisfactory wage incentive plan, became the key to the solution of production and management problems.

Although Taylor as well as others developed general thoughts going somewhat beyond the shop level, scientific management emphasizing the one best way generally remained at that level. With the passage of time, beginning roughly in the 1920's, broader aspects of management found wider expression, especially through associations of interested business leaders.

## II

The present-day college of business had its origins around the same time that the management movement was coming to the fore. In 1881 the Wharton School of Finance and Commerce was established at the University of Pennsylvania. From 1881 to 1902 it was called the Wharton School of Finance and Economy. In 1898 the present-day School of Business Administration was established at the University of California (Berkeley) as the College of Commerce. Although the

<sup>2</sup> Cf., e.g., Richard H. Shryock, "The Academic Profession in the United States," *American Association of University Professors Bulletin*, Vol. 38 (Spring 1952), pp. 32-70.

<sup>3</sup> Cf. John H. Hoagland, "Management Before Frederick Taylor," *Academy of Management, Proceedings of Annual Meeting*, 1955, pp. 15-24.

title of the business school proposed at Chicago in 1894 and formally established in 1898 was changed several times, it always included the term commerce in the early years. The School of Commerce, Accounts, and Finance was established at New York University in 1900. The names given to these schools suggest what it was thought the offerings should be. They were to be concerned with accounting, finance, and commerce. One or more of these three designations appeared in the names of most of the schools of business founded in the early 1900's.

The emphasis on accounting and finance reflected the expansion and growing complexity of business and the desire for advanced instruction going beyond bookkeeping. Offerings in this field appeared in evening programs in metropolitan areas. New York and Philadelphia were, of course, also centers of finance. The term commerce was readily translatable both into a general term covering what might be considered relevant business material taken over from economics, including transportation, and also into the more specific field of marketing which was a relatively early field at most of the schools, including the Harvard Business School, which founded in 1908. The importance of marketing was readily seen in the growth of productivity, the widening extent of the market, and the highly developed transportation system.

These fields were also in the university tradition. Although introduced into the school of business for practical reasons, accounting could trace its heritage to earlier related offerings at some of the colleges. Indeed, it was traceable back to Paciolo who is considered the father of modern accounting since his *Summa*, published in 1494, which was the first printed work dealing with algebra, also contained the first text on bookkeeping. Paciolo taught several subjects at different universities and, as Henry Rand Hatfield put it, his "academic credentials are flawless." His presentation of bookkeeping, Hatfield said, "was not crude and incorrect but contains the essentials of bookkeeping as we know it today, despite the fact that it was written at a time when chemistry partook of the vagaries of alchemy, biology was a weird collection of errors, and medicine had more in common with the medicine man than it has even today."<sup>4</sup>

Finance, marketing, and various other related offerings rested squarely on economics from which they were a distinct outgrowth.

It could be very easily shown that the field of management might have been developed out of economics. Among the several concepts in economics which come readily to mind in this connection are the entrepreneur, the wages of management, diminishing returns, non-competing groups, and so on. Moreover, those with a background in economics who teach management find it desirable to include adaptations from economics where they provide an appropriate framework for the discussion of particular topics.

However, for a variety of reasons the role of management was somewhat neglected in economics. Probably one reason for this was the carrying over of the concept of the entrepreneur who organized and managed his business which was

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<sup>4</sup> *An Historical Defense of Bookkeeping*, May 15, 1937, p. 11. (Republished from *American Association of University Instructors in Accounting, Papers and Proceedings*, Vol. 8, December 1923, pp. 65-75.)

relatively small when compared with the larger-scale business enterprises in process of development.<sup>5</sup> In the earlier period it did not seem essential to consider the content of the entrepreneur's management task.<sup>6</sup> Stated in another way, the early economist may be said to have conceived of the businessman and his behavior as purely passive, his success depending on adaptation to impersonal forces which he did not control or influence.<sup>7</sup> Drucker called this the concept of the trader and added that, although today's economist regards the businessman as choosing rationally between alternatives of action, nevertheless the present concept is still that of a passive businessman who in attempting to maximize profits simply reacts to economic developments. This concept, he suggested, is that of the investor or the financier rather than of the manager.

When the economist discovered that management was increasingly separated from actual ownership, this feature was included in discussions of the firm. But little or no attention was given to what the managers were doing, that is, to what the content of their function was becoming. In other words, the professionalization of management and its significance were generally ignored beyond the statement that management had become separated from ownership and (sometimes) merely that management was becoming professionalized. It was easy to get the impression from the economics texts that management could be taken for granted as an almost automatic process, although the 1960 edition of one popular text at least mentions that management is concerned with decision-making.

From the point of view of economics, this overlooking of management was unfortunate because it tended to divorce economics from as good an insight into certain important economic developments as would otherwise have been possible and it left a gap in twentieth century general economics and principles texts which the reader of any of these books who had some understanding of actual developments keenly noticed. It was also unfortunate from the point of view of the field of management because economists with a critical view toward and insight into management could doubtless have made useful contributions.

Although it has in recent years been frequently and properly suggested that business schools should draw on such disciplines as anthropology, engineering, mathematics, political science, psychology, and sociology, these specialties are not in a position to take the same over-all view open to economics. Even though they contribute to an understanding of various aspects of business behavior and management, economics is more basic for business than any of the others can be. Although the economist frequently regards economics as a science, he may also play a philosophic role in being critical toward and providing a critical insight into management theory and practice.

In any event, the fact remains that management did not develop out of economics. At best, it may be concluded that, in the school of business, management was at first presumably taken for granted, since attention had not been adequately

<sup>5</sup> Cf. Robert Aaron Gordon, *Business Leadership in the Large Corporation*, The Brookings Institution, Washington, D.C., 1945, pp. 3-12.

<sup>6</sup> *Ibid.*, p. 8, footnote 8.

<sup>7</sup> Cf. Peter F. Drucker, *The Practice of Management*, Harper & Brothers Publishers, New York, 1954, p. 11.



and properly called to it as an appropriate field of study. Later on, as scientific management attracted attention, it was associated in the minds of many with engineering.

### III

When industrial management or industrial organization and management courses were finally introduced, they were associated with scientific management at the shop level in manufacturing. Carried over from scientific management, they turned further in the direction of techniques. Such specialized areas as production control, time and motion study, wage incentive systems, industrial purchasing, and quality control attracted attention and were added as courses. Personnel administration, which became of interest because of its development in business firms, was readily associated with the other offerings in the field. Management departments, as Dalton E. McFarland put it, "... were a convenient location for subject matter spurred by Frederick Taylor's concepts of scientific management and by the growing popularity of personnel administration. They also became a dumping ground for subjects that didn't seem to fit anywhere else, as well as a place for locating the integrating course in business policy at the senior level."<sup>8</sup>

Broader aspects of management were at first introduced by indirection. The textbooks on industrial organization and management themselves dealt with management on different levels. The discussion of time and motion study, wage incentives, production control, and so on dealt with various aspects of shop management. In connection with such matters as organization, line and staff, and product development, however, these books took up matters of general management in combination with those at the shop level. In treating of location, labor policies, and general policies, the books were concerned with general management. The same approach was also reflected in the various advanced offerings introduced at some institutions. Among these, for example, the offerings at one large eastern university, which developed a wide reputation for management, attracting increasing numbers of graduate students pursuing the master's degree, developed an unclearly-presented dichotomy of offerings in production or industrial (manufacturing) management, on the one hand, and general top management and administrative theory, on the other.

At the engineering colleges where industrial engineering was introduced as a professional field in relation to scientific management, basic engineering and science courses were included together with such courses in economics and business as seemed appropriate to the particular institution's faculty, offerings, and students, including the level of the latter's ability. Roughly speaking, the offerings at the engineering colleges were more technical than those at the business colleges, although some of the former moved in the direction of emphasizing economics and business, while some of the latter with majors in production moved in the technical direction. Howard L. Timms writes that just what industrial engineering should

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<sup>8</sup>"Education for Management: New Directions and New Challenges," *The Journal of the Academy of Management*, Vol. 2 (April 1959), p. 43.

comprise is not entirely clear even to many engineers, including himself.<sup>9</sup> Some of the literature suggests that the ideal combination of intellectual qualities demanded would be found somewhat infrequently. In any event, concern with manufacturing was thus reflected in both the engineering and the business colleges.

#### IV

At some of the colleges of business, indications of a more definite emphasis on broader considerations finally became apparent in a limited way in the 1930's. The Academy of Management dates its origin in 1936, but its organizational literature refers to the fact that the prewar years represented a period of struggle for continuance through irregular meetings of small numbers of interested individuals. Although a constitution was adopted on December 30, 1941, several weeks after the United States officially entered World War II, the Academy did not reassemble again until 1947, some time after the close of hostilities. After that it began to grow in membership and influence.

The Academy "is not concerned primarily with specialized procedures for the control and execution of particular kinds of projects that are significant chiefly in narrow segments of a business field." Rather, its interest "lies in the theory and practice of management." During the years after World War II, while the Academy was attracting an increase in interest and membership, a corresponding development was taking place at a number of the larger universities where courses, texts, and related literature began to take shape.<sup>10</sup> Today there is a variety of texts and other materials, although they probably represent only a beginning. The implication is that there is no single one best way, since it is recognized that there are alternative possibilities.

However, such developments have as yet not been reflected in the offerings of a number of institutions. The principal difficulty would seem to be that clear distinctions are frequently not drawn between the areas associated with industrial management, on the one hand, and the broader field, on the other. Systematic coordination apparently does not exist in some instances where offerings are provided in both areas. Some institutions continue to be concerned largely with industrial management or production. In some instances, there has apparently been uncertainty as to the direction into which to encourage developments.

There appears to have been insufficient effort as yet to clarify the situation as it now exists. Since doctoral programs in management are comparatively recent, there are as yet few who hold the doctorate in the field. Moreover, since some of these are younger and comparatively inexperienced men, their opinions may often not be sought or at any rate heeded as they join business faculties. In any event, such men have frequently been left uncertain in their own minds. For some years, the American Association of Collegiate Schools of Business left the matter unclarified. In its "Undergraduate Standards for Membership" (as amended to May 8, 1959), item (4) lists the basic courses in which instruction shall be offered as the founda-

<sup>9</sup> In Frank C. Pierson and others, *The Education of American Businessmen*, McGraw-Hill Book Company, Inc., New York, 1959, p. 488.

<sup>10</sup> Charles E. Summer, Jr., *Factors in Effective Administration*, School of Business, Columbia University, 1956, surveyed these courses.

tion for training in business administration and includes management as the concluding one. The following statement then appears: "Management is here used to denote Industrial or Production Management, or an integrating course in organization and management or a business policy course." Not until 1960 did the A.A.C.S.B. eliminate this statement from its standards.

It is obvious that "Industrial or Production Management" is in the narrower category which evolved out of scientific management, as indicated above. Although a course in "organization and management" might be conceived of in the same light, it can also be broader as indicated by the contents of some texts. Presumably, however, "business policy" definitely demands a broader treatment. Perhaps the definition reflected a compromise of conflicting views based on the offerings as developed at different member institutions.

## V

Several years ago John F. Mee made an attempt to clarify matters when he suggested that business is primarily concerned with creating utility and that this is the area of production or industrial management, the course offering in which he placed organizationally on a horizontal level with finance and marketing. The three of these were placed under a course which he suggested might alternatively be called "administrative management," or "business policy," or "principles of management." This course he thought of as "an integrating course which is not only related but also essential and applicable to all other operating and specialized disciplines." The proper place of management in the curriculum, he suggested, was in such an integrating course which should in general embrace "business objectives, policies, ethics, executive leadership, planning, organizing, directing or motivating, coordination and control as applied to all functions of organization and operation."<sup>11</sup>

In connection with these proposals, several difficulties suggested themselves. For one thing, all functions of the business contribute to the creation of utility. All aspects, activities, and operations of a firm may be regarded as functional staff to the carrying out of its policies and the achievement of its objectives. In Mee's context, the placing of production or industrial management on the level horizontal with finance and marketing seemed to imply that all businesses are engaged in manufacturing. While finance and marketing are functional to all businesses, manufacturing is not. Banks and other financial institutions engage in their own kind of "production." In addition, the study of specific aspects of the management of such enterprises falls under finance. For department stores, wholesalers, and other marketing enterprises "production" is still another matter. The study of the specific aspects of the management of such enterprises comes under marketing. All of this again raised the question of the place of industrial management.<sup>12</sup>

<sup>11</sup> "The Place of Management in the University Curriculum," *Academy of Management, Proceedings of Annual Meeting*, 1954, pp. 16-22.

<sup>12</sup> Indiana University's Management Department headed by Mee was in 1959 reported to have been divisionalized into (a) Personnel and Industrial Relations, (b) Production Management and Industrial Engineering, and (c) Administrative Management (*The Journal of the Academy of Management*, Vol. 2, December 1959, p. 205).

Howard L. Timms suggested later that the course in production management should take a functional approach to the subject, using the manufacturing firm as a model but showing the generally universal nature of the production function. The course, he said, should be concerned with management and not the operative (and thus vocational) work of the firm; it should be oriented toward the application of the rational management process to the work of production at all levels of management and not just to top management.<sup>13</sup> Gordon and Howell likewise recommended dropping the present typical factory management course and substituting a newly developed course under the heading of production management and dealing with the economic problem of production (or operating) management.<sup>14</sup> Micro-economics and the quantitative disciplines of mathematics, statistics, and accounting are, they say, most relevant for the analysis and solution of economic production problems. Such a course, according to the authors, would to a considerable extent be inevitably concerned with manufacturing production but should be extended to deal with the economic problems of managing physical resources in other types of business.<sup>15</sup>

## VI

If the present courses in industrial management and its proliferation are continued, they should at least be clearly designated as and under manufacturing. There is, however, considerable doubt as to whether this area should be continued as such. Not only is the basic course not needed as an introduction to management, but in addition such courses as financial and marketing management contribute on a more advanced level to preparation for an integrating course in business policy.

The relevant question is how much of the material in the realm of manufacturing techniques constitutes a proper academic field. Since the material stemming from the original scientific management area does not appear to constitute or rest on an independent theoretical discipline subject to cumulative development as an intellectual field, there is some question as to whether it constitutes a body of knowledge appropriately included among university offerings.

In connection with the suggestion in the Gordon and Pierson reports that production be developed, the question arises whether this would amount mainly to an upgrading of required abilities and materials, chiefly along quantitative lines, of material already implicit in the present course and whether this involves the teaching and learning of skills to be hired by managers for staff work.

If management is to have a claim to continue as an independent discipline on the university level, it must be understood to have developed out of or rest on other such disciplines and it must itself be research-oriented<sup>16</sup> on the basic assumption that it is itself capable of cumulative accretion.

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<sup>13</sup> Pierson and others, *op. cit.*, p. 480.

<sup>14</sup> Robert Aaron Gordon and James Edwin Howell, *Higher Education for Business*, Columbia University Press, New York City, 1959, p. 192.

<sup>15</sup> *Ibid.*, p. 193.

<sup>16</sup> Cf. Dalton E. McFarland, "The Emerging Revolution in Management Education," *The Journal of the Academy of Management*, Vol. 3 (April 1960), p. 15.

# *A Course in the Application of Linear Programming to Production Problems*

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Certainly one of the most promising trends in the management area in recent years has been the application of mathematical models to business problems. The majority of the people associated with these developments, however, have come not from the field of business administration but from other academic disciplines, especially mathematics, engineering, and the physical sciences. Much of the development has been theoretical or illustrative, as might be expected where most of the interested persons have been essentially interested in techniques themselves rather than in the results of applying techniques. Although some examples of profitable applications of these techniques have been published, (and no doubt others are still veiled in secrecy for competitive reasons), the use of mathematical techniques has not by any means become routine in business.

The missing link seems to have been a skill in application—a rather different thing from the technical skill necessary to manipulate mathematical models or even to conceive of the models themselves in abstract terms. Simply put, it is the ability to recognize specific opportunities in a specific business organization for the application of the mathematical techniques which have been developed. It also involves the ability to determine what kinds of factors must be incorporated in a model for it to be useful in such a specific situation, and the ability to propose appropriate assumptions (or ways in which they may be established). Finally, this applications skill should include the ability to interpret—again within the frame of reference of a specific situation in a specific business—the results of analyses made using the mathematical model, with a keen appreciation for the kinds of changes that might reduce its usefulness or even render it invalid. A person with this kind of skill needs a basic knowledge of the mathematical techniques involved, but that alone is not enough.

To find out what might be entailed in bridging this gap, the author offered an experimental elective course in the spring term of 1960 to nine graduate students in the last term of a two-year MBA program. The alternative of undertaking an across-the-board revision of the entire curriculum would have required more resources than were available. Furthermore, there would have been grave risks in making drastic changes without a more intimate understanding of what would be involved and what would be gained by these changes. A single course offering



could be expected to shed some light on these questions and therefore on the advisability of ultimately making major curriculum revisions affecting courses other than those in production.

One and only one mathematical technique was treated: linear programming. Registration required permission of the instructor; the main purpose of this requirement was to make certain each student understood the experimental nature of the course and the heavy work load programmed. This requirement also was used to restrict the size of the group to try to keep the instructor's workload more manageable.

### THE MAIN FEATURES OF THE COURSE

The main elements of the course plan, in the sequence in which they occurred, were: training in solution techniques; a literature search of applications; a demonstration of a computer program using the simplex technique; a field project, a business problem in the solution of which linear programming could be helpful; and the preparation, presentation and discussion of a final report on the problem undertaken. The time allocated to training in the solution techniques was kept to a minimum, and speeded by scheduling additional classes in the first three weeks of the course. The bulk of the students' time was spent on field projects.

If proper identification, suitable mathematical formulation and a broad-gauged analysis of the results were to receive the desired emphasis, the time spent studying techniques had to be restricted. For this reason linear programming was selected as the only mathematical technique to be employed. In addition, to avoid laborious hand solution of problems, an IBM 650 computer was used which had linear programming programs already available in its library.

The course carried three hours of graduate credit. Only twenty class sessions were held because of the large amount of field work involved; all of the class sessions, however, were for two hours each. The outside work load was heavy and each student undoubtedly spent 200 hours or more of his time on the course.

Each of the principal elements is described in more detail as follows:

*Step 1.* A fundamental task was to develop an understanding of the linear programming technique. The two chapters on linear programming in Bowman and Fetter's *Analysis for Production Management* were utilized as a text and Gass' *Linear Programming* was used for supplemental reading. To lay the ground work for understanding the general nature of linear programming, an initial lecture depended upon a two-dimensional graphic analysis. (No attempt, by the way, was made to establish firm prerequisites, but interviews indicated that all nine students had at least the equivalent of college algebra and a few of them, substantially more.) Some ten problems were assigned and both the simplex and transportation types of solutions were covered. In execution, this stage presented only minor difficulties.

*Step 2.* The next step was intended to provide the students with some background in the variety of ways in which linear programming has been applied. Each student searched the periodical literature for two examples of the application of linear programming to production problems, and for each of these applications made an oral report which was discussed by the class. A written summary, which stressed the type of application and the method of formulation, was submitted for each article and the collection of all of these was placed on reserve in the library for later reference by all the students.



*Step 3.* One program for solving a linear programming problem on the 650 computer was analyzed, and simple problems were formulated and run in a demonstration. A computer program which used the simplex technique was selected because this method would solve all problems the transportation method would solve, as well as others the transportation method could not. If the transportation method seemed to be useful in a particular project, it might still be used and solved by hand because of the simplicity of that method.

*Step 4.* The field work was designed to be the major element in the course. The initial phase of field work began immediately after the literature search, but only initial "project finding" activities overlapped the analysis of a computer program just described as Step 3. The students were divided into teams of two (in one case, a team of three) and were given the assignment of finding a production problem (broadly defined to include transportation and warehousing problems), in the solution of which linear programming would be helpful. It was emphasized that linear programming might well not give an answer, but might merely provide part of the answer for the problem attacked.

Each team was directed to define a problem on which it wished to work, to formulate the linear programming model they wished to employ, to gather the data necessary, to run linear programming solutions on the computer, and to prepare a written report setting forth their recommendations for action. This report was to be used for both a class presentation and, later, for a presentation to the company.

Before the field work phase formally began, one group already had a problem developed through friends in business. The instructor assisted the other three groups to find suitable problems in local concerns. Finding such opportunities among firms willing to cooperate in the plan of instruction could have been a major bottleneck, especially if the class had been larger. Fortunately, only five firms had to be visited to develop the three additional projects required.

Each team was required to submit two interim reports in writing during the field work stage. The first was a preliminary statement of their project indicating the nature of the problem and how linear programming was expected to assist in the solution. The second was a statement of the form of the matrix and the data required therefor. On both occasions special class sessions were scheduled and these reports were presented orally to the class for its criticism. These reports were felt to be essential to keep projects proceeding on schedule.

Throughout the field work phase each team worked with the instructor on an appointment basis outside of the class schedule to deal with the individual problems which arose.

*Step 5.* The next step was the solution of linear programming problems developed in the field work on the University's IBM 650 computer. The quantities of data involved proved to be much greater than had been expected. The smallest matrix used was 14 rows by 68 columns and the largest about 6 rows by 350 columns. This made it necessary to utilize computer programs other than the one originally planned because the program originally planned lacked capacity to handle this quantity of data. Two of the largest projects were able to utilize a transportation method solution (but by machine, and not by hand), while two required a simplex solution.

*Step 6.* The last stage in the course was to hold critiques of the final reports. Each team's final report was mimeographed so that each class member had a copy of all four reports. Each final report included a statement of the problem, the analysis and conclusions, and a statement of the fundamental assumptions underlying each linear programming model. This last requirement of making fundamental assumptions explicit was effective in obtaining some degree of self-analysis by each team prior to the critiques by the class. Following the last class and after making any appropriate revisions they deemed necessary, each team arranged to present its report to the company personnel with whom they had worked. To insure the confidential nature

of the data, each class member returned to the company concerned all copies of the reports and the stencils from which they were produced. A commitment to do this had been made at the time the companies were asked to cooperate with the teams.

### THE NATURE OF THE PROJECTS UNDERTAKEN

The nature of the teams' projects may be of some interest. One concerned the most economical method of scheduling a one-year run for each of two products in a plant manufacturing electrical products. It was found necessary in this case to first develop a method for making a one-year forecast because none was available from the company. A second team studied operations in a food products plant, exploring the possibility of cost savings by making direct shipment of several products from factory to customer and bypassing intermediate warehouses. A third team also worked with a food products producer, studying how to minimize the sum of both production and transportation costs in distributing the products of several factories to more than 300 distributors. The fourth team worked out a system for scheduling a month's production on trimming equipment in a paper converter's plant. The problem was to minimize waste in cutting large rolls of paper into smaller sheets, to fill customers' orders. The mix of customers' orders varied each month, both in dimensions of the sizes required and in the quantities of each.

### EVALUATING THE RESULTS OF THE COURSE

The results of this experimental offering convinced the instructor that a thorough grasp of a mathematical technique such as linear programming can be taught, and can be taught rather quickly, to students of this caliber, even though they possess limited mathematical preparation. The results also convinced him that application of mathematical techniques is a special but "trainable" skill of major importance, a skill which goes beyond knowledge of the techniques themselves. In particular, the steps of defining the problem and formulating the linear programming contribution to its solution emerged as vital ones. The interplay between general business background and diagnostic skill, on one hand, and the nature of the linear programming technique, on the other, was noticeable in all of the projects but especially in two of them in which the possibility of production process changes was recognized as a method of relaxing important restrictions in the linear programming model.

Not all of the results of the course were so satisfying. The heavy work load which developed in using the computer was unexpected and, in the end, onerous to both the instructor and the students. The basic reason for this was the fact that the linear programming models developed incorporated much larger matrices than had been foreseen. The larger matrices precluded any hand solution, even for transportation-type problems, and naturally increased the running time required on the computer to get solutions. More importantly, two of the problems were so large that the basic data could not be stored in the computer but had to be fed in their entirety into the machine with every iteration.

The larger matrices not only required the use of a transportation-type computer program (which had not been planned) but also required the use of a differ-

ent simplex computer program than the one which had originally been prepared and demonstrated. These changes meant that two additional programs had to be "debugged," a task in which the instructor himself was quite inexperienced.<sup>1</sup> Other computer problems arose from the unfamiliarity of the programs themselves, and, in particular, failure to understand in detail the sequence with which some computational steps in one program were carried out. Had the computer programs been better understood in the beginning, it seems quite likely that a significant proportion of the computational time taken might have been saved. Even so, because the problems were much larger than had been anticipated and because in two cases they were so large as to exceed the storage capacity of the computer, sizeable amounts of computer time still would have been necessary.<sup>2</sup>

Another discovery during the critique sessions on the final reports was the degree to which every group would have benefited substantially from a second round of analysis, in which the original model could be modified, solved once more, and the results analyzed. Since discussion during the critique sessions was focused on the explicit and implicit assumptions underlying each report, it frequently became apparent that changing successively the values assigned to one or two factors in the model, would have permitted further, promising analyses of the underlying business problems. In some cases the additional analyses could have tested the effect of changing a basic policy decision. Unfortunately, there was time to proceed in this fashion on only one of the four projects. The potential value of a second round of "model modification" for all the other projects, however, seemed to be considerable.

Finally, it was surprising to discover how the value of the training in application went beyond the scope of linear programming. In particular, the preparatory investigation—working on a definition of the problem and a general approach to it (before linear programming was applied in any way)—was frequently mentioned by the students as having been of great value. For instance, the members of the team which found it had to develop a method of forecasting sales for a product before it could work on production scheduling problems not only found a chance to apply some of the things which they had learned about sales forecasting in another course but they also gained greater understanding of the problem of coordinating the marketing and production functions in a business. All of these students had had a great deal of instruction by the case method before this time and while this kind of training was clearly of great help to them in managing their projects, they universally reported getting something more, something different and something which they felt was very valuable from the experience of grappling with a "real-life" business problem for which they bore no little personal

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<sup>1</sup> No one in the local metropolitan area could be found who had had any experience at all with one of the programs used and only one person was found who had had limited experience with the other program.

<sup>2</sup> Fortunately, negligible problems were caused by errors in preparing the input data. As a check before each problem was run on the computer, the cards which comprised the input data were run through the IBM tabulator and listed, and this list was compared by a team of two students with the original data from which the cards had been punched.

responsibility. It is probably reasonable to conclude that the concept of skill in application can apply not only to new techniques such as mathematical programming, but also in some degree to many of the more traditional business techniques as well.

### CHANGES PROPOSED FOR A SECOND ROUND

For a second round of the course in the spring of 1961 three significant changes are planned. First, and of greatest importance, the scope and definition of projects will be more closely controlled to reduce substantially the amount of computer time required. For instance, a tentative maximum linear programming matrix size of 20 by 40 will be set. Some projects may have to be rejected as a result, but in many cases it may mean only a reduction in scope, or a grouping of data. If the course is to be offered to larger numbers of students (and this is a long-run objective), the computer work load must be reduced. On the other hand, since solving "real-life" problems so often calls for using a computer because of the quantity of data involved, there is no intention of abandoning this phase of the course. A graduate assistant capable of taking over most of this task would help the instructor greatly if a qualified person could be obtained.

The experience with this experimental course also indicates the desirability of training the student to use, in addition to linear programming, other mathematical techniques. Queueing (waiting line) theory, the Monte Carlo method, and other mathematical models would have enabled the students to undertake some interesting problems encountered which were rejected because they provided no applications of linear programming. They also could have been utilized in further analysis of some of the problems actually undertaken. At the conclusion of the course the students were asked for their opinions on this point and they all agreed upon the desirability of including additional techniques. It was apparent, of course, before the course was given that training in two techniques, all other things being equal, would be more desirable than training in only one. The opportunity for using other techniques, however, was simply underestimated. Furthermore, from an administrative point of view the experience demonstrated quite forcibly that having more techniques available probably would have made the search for projects significantly easier. This consideration is especially important in view of the first change proposed above, of imposing restrictions on the size of acceptable linear programming problems.

Finally, the steps of revising the original model and making a re-run of the mathematical analysis, will be added. The time required for these added steps and for including additional techniques will be obtained by meeting more frequently (and perhaps for longer periods) at the very beginning of the course and by reducing the size of the projects selected so that an earlier due date for the various stages (including first report critique sessions) can be fixed.

### SUMMARY

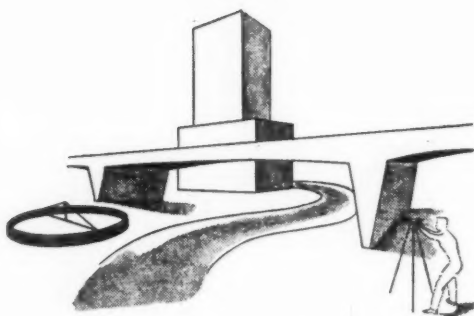
As an experiment, the instructor believes that this course, stressing the development of application skills, was successful in demonstrating the value of the basic

idea and in exposing problems which would have to be solved to make such an offering more generally useful. A major problem was the amount of computer time required to solve the linear programming problems selected by the student teams. Furthermore, if the required time could be made available, modification and additional analysis of the models each team developed promised to provide an unforeseen but valuable opportunity for further learning. For a variety of reasons, it also seems desirable to increase the number of techniques included.

These problems might be solved by instituting a "core" course devoted to a broad coverage of mathematical and statistical techniques, stressing theory and solution techniques, rather than application skill, and requiring that course to be taken in the first year term by all MBA students. The time devoted in the applications course during the initial sessions to teaching techniques would thereby be released and could very profitably be used to advantage in the field work stage, or in further analysis and reworking of final reports, or both. Such a solution would have the added advantage of being a foundation which could be used by students not only in all advanced courses in production but also in the advanced courses in marketing, finance and policy. Although manning such a course creates a major problem, and although the curriculum would have to be revised to provide the class time required, it seems to be the ideal solution in the long run. In the meantime, the author is seeking a more efficient temporary solution by the revisions indicated above.

This experimental course may also be relevant for business-sponsored management training programs. Many businessmen at all levels of management desire training in mathematical techniques. These needs would seem to justify company-sponsored training programs to provide this kind of developmental opportunity for managers. The approach suggested by this experimental course offers an appropriate format for training management personnel in the application of mathematical techniques. Field projects could be developed from the team members' own company, thereby facilitating the execution of that important phase of training.





## *Management in Perspective*

### JAPANESE MANAGEMENT RATES ITSELF— AN EXPERIMENT IN APPRAISING "BUSINESS EFFICIENCIES"

Good teachers invariably learn something from their students. Particularly since the war, American management has, through such agencies as ICA as well as more directly, assumed the position of instructor to industry around the world. Without doubt, our missions to Columbia, Holland, Japan, and to other nations more or less advanced in managerial and technological development, should have brought back to American executives not only a better understanding of foreign policies and techniques, but also innumerable examples of success or failure in the universal drive towards more efficient management, increased production and improved human relations.

One attempt to measure the success of management in attaining the results sought by leaders of private business everywhere may be reported currently from Japan. This program is almost entirely the work of one man. In a country which has seen much state intervention in efforts to foster and control the progress of business, Koichi Inoue has become an independent missionary to management, riding his own circuit unsupported by government.

Following his retirement from Hayakawa Electric Machineries Industry Company, Inoue has studied the administration and operation of several hundred Japanese companies. Visiting plants throughout the country as an individual consultant, he has developed, in what some might call typical Japanese fashion, a formula and a system for the appraisal of a firm's management. And because the evaluating may be done by the company's own management, using a checklist of Inoue's invention, the procedure also provides guidance and inspiration for these executives to follow some of the same precepts of good management which are known to American managers. For it must be observed that the principles and purposes of management accepted by Inoue and other Japanese consultants are in great agreement with the best thinking of their American and European colleagues.

Inoue's checklist includes fifteen items, each the subject for evaluation by management on a ten-point scale. Each of the criteria is differently weighted, the values running from 34 to 130, so that (by multiplying the judgments of the manager by the designated weights) a "perfect" total score of 10,000 might



theoretically be obtained. Passing is set at 7,500, Inoue conceding that a company scoring higher than this is in "good shape."

Three factors, it is plain, determine the total "business efficiency" score—the judgment of the manager rating his own concern, the weights given the items used as criteria, and the original determination and description of these items. As to the first, the problem of the untrained rater, perhaps it might be assumed that management is aware of its relative success, or lack thereof, in solving its own problems, and would be able to translate its judgment into scale values of 2 for 20% success, 5 for 50%, and so on. Moreover, Inoue's practice is to ask several members of management to make independent evaluations, and then to average their judgments before multiplying the resulting figure by the given weight for the item in question.

The varying weights themselves were first suggested by members of the Modern Management Club of Japan. These were then adjusted by Inoue on the basis of his own wide experience. That they may further be changed with additional experience is suggested by his admission that "these weights were adopted tentatively." It may also be noted that, despite the wide range, 34 to 130, a majority of the values fall between 48 and 75, and that these are distributed almost equally in the three areas of general management, production and human relations.

But this brings us to the crucial question: What are Inoue's items, and into what categories do they fall? For the three-part classification just mentioned is not openly observed by him. Instead, Inoue groups ten of the criteria under the following three major headings:

- (a) Extent to which the company will continue to exist and grow.
- (b) Degree of high wages, high efficiency and low cost.
- (c) Degree of safety and sanitation maintained.

These three categories account for a possible total of 4,940 "ideal" points—only, however, less than half the grand total.

The remaining five basic items, potentially responsible for a majority of the total score, are especially interesting to the non-Japanese student. I paraphrase them on the basis of a translation made for me by Yasutaka Sai, International Manager of Nippon Noritsu Kyokai (Nippon Management Association):

- (d) Extent to which the company has attained a self-sustaining organization structure.
- (e) Extent to which the company has produced both for domestic and foreign consumption.
- (f) Extent to which the company maintains harmony and production-consciousness among its people.
- (g) Extent to which the company earns a profit on its investment and pays dividends.
- (h) Degree of modernization of production methods and techniques.

These are further identified and qualified as having to do with certain problems of special significance to the Japanese businessman. Inoue is concerned as to whether attention has been paid towards achieving "business independ-

ency" since the end of World War II. He asks that "perfect customer services should be provided." He gives greatest weight (130) to management's promotion of "harmonious and cooperative spirits among management and workers," assuming that this will forward "production consciousness." Turning to finance, he urges a matter of great importance and difficulty to the Japanese manager, that his company succeed in paying "more in dividends than it does in interest on its bank loans." And with even more weight, he demands that plant equipment be modernized and new methods of production utilized.

Similarly, Inoue's specifications regarding the items which he does distinguish under the major headings show that, in addition to recognizing universally accepted principles of management, he wishes to give special attention to problems which are more peculiarly Japanese. For example, he wants the company to "train and develop managers of the next generation." "Basic studies and applied researches" should be enthusiastically supported "to develop new products and/or make goods of better quality." But note, also, that production should be coordinated both with sales and with "the disposal of returned goods." Indeed, additional emphasis and points are given to the maintenance of "good team-work among key personnel, including a financial manager, a production manager, a sales manager," who thus are recognized as performing specific functions "immediately under top management."

Perhaps American managers would envy Inoue's frankness in stating that a company should adopt the policy of "paying employees good salaries in order to expect them to work hard," but he then rates management on its success in getting employees to work "without waste motion . . . fully paying off the good compensation given them." American managers will note, however, that the compensation of employees is thought of in terms of salary rather than wages, which itself may suggest why there is a special Japanese problem in this area.

Further analysis of the features of Inoue's checklist which apply differentially in comparing American and Japanese business must be omitted at this time if we are to comment on his choice of evaluating criteria. Do they comprehend the entire scope of management? Do they reflect Inoue's awareness of all the functions of management and of business? What areas, if any, are neglected? Does Inoue, in short, show balance and judgment in the construction of his questionnaire?

With some understanding of Japan's present concern, public and private, for increasing production—truly amounting to a "productivity movement"—it comes as no surprise that the largest subtotal of possible points should be given to product and production planning, to methods improvement, and closely related subjects (363 weight points.) But both to balance this "industrial engineering" approach and in possible furtherance of the same goal, almost as much weight (342 points) goes to employee relations, morale, and labor-management relations.

Remaining is the area of administration, or the management of management. To managerial organization, executive staffing and training, and the maintenance

of cooperation and coordination, Inoue devotes 205 points, to which another 90 may be added if the overall test of the concern's profit position be added. Thus, not quite equal thirds of the evaluation are distributed among the areas of production, personnel and management—a distribution of attention which is not always matched by American students of business, and almost never by engineers who have laid a wreath on the tomb of Frederick W. Taylor, as did Inoue on a visit to this country some time ago.

Further analysis of the checklist shows that the management functions of organizing, staffing and planning are explicitly recognized, while directing and controlling receive somewhat less attention. Control is probably less stressed than it would be in any American attempt to evaluate management. No mention whatsoever, for example, is made of budgeting or the utilization of accounting.

Similarly, with regard to the functions of manufacturing business, there is some imbalance, and for the purposes of Japanese management this is even more regrettable. As already noted, production is emphasized, but this emphasis is the more unfortunate given Inoue's comparative neglect of the functions of sales and finance. True, he does pinpoint three problems of special import to Japan, excessive dependence on bank loans, difficulties in coordinating sales with production, and the necessity of planning for the foreign market. But so grouped, references to these two functions together do not come close to giving the weight assigned to production alone.

Students of management who believe that in its principles it remains universally true, despite local or international differences in technique, should be interested in Japan's relatively sophisticated understanding of the nature of good management as this may be seen in the achievement of Koichi Inoue. For his discovery, and the lesson he would teach Japan, is something less "typically Japanese" than the construction and use of a formal checklist.

Inoue does not depend simply upon scientific management of the sort so often envisaged—the mechanical application of the same magic formulas and systems to every business. "Learning from the methods and techniques of other businesses may certainly broaden a manager's knowledge, but the best approach to his own management problems can only exist when there is sufficient recognition of the importance of transplanting such knowledge into a wisdom of his own in a fashion best to meet the circumstances of his own company." Inoue would therefore have every manager "able to pave a way of his own." It is "enterprise itself that must develop systems of its own—this is never a job to be expected of others."

So, in encouraging managers to observe the principles of management, but to "have enough courage to use planning, rational thought and good sense," Inoue would create a business community based on scientific management, but also "an environment where individual prestige may be respected" and where "each enterprise exerts efforts toward research and development . . . in order to sustain itself with its own features and characteristics." In this he speaks for many other Japanese managers and consultants who are presently bravely trying to establish their own individualities, often arguing almost poetically

about the need for "company identification," much as we talk about the need for product or brand identity.

It is in line with Inoue's philosophy of business, therefore, that his checklist is limited to fifteen items, and that two-thirds of them point to the importance of management—the kind of management that has been called "90% personnel management," the management of managers and employees.

For such a management, it is the "effort for self-development that will no doubt determine the future of a company of any size . . . all will depend upon individual efforts toward the establishment of new and better systems of management." But the systems must be particular to the individual company, and it is here that Inoue finds the "real and very fundamental principle underlying the continued existence and future growth of any single enterprise."

Is it not possible that we in America, the home of individualism and free enterprise, may yet learn from some of our most apt foreign pupils?

W. J. ARNOLD  
Management Editor  
*Business Week*

#### CONTROLLED PLANT INFORMATION (CPI) ANALYSIS AND DESIGN MODELS

EDITOR'S NOTE: This discussion is based on the author's reactions to Roger Christian's article, "Controlled Plant Information," *Factory Management and Maintenance*, Vol. 118, No. 7, August, 1960. It contains suggestions for two planning models that have aroused the interest of numerous companies.

Why bother with an analysis model? Particularly in systems work, one can quickly get lost in endless details. It is impossible to sift, screen, discard, save and finally integrate the relevant materials without a realistic frame of reference. Technicians and executives must be able to see what they are doing within a boiled-down model of the system.

The first model—one which actually poses an issue as to what an eventual data processing system will embrace is shown in Figure 1.

Figure 1 is a controversial model, and resisted by proponents of single, fully integrated systems. It is also opposed by those favoring centralized equipment centers, who readily see that two data processing centers are suggested. I use this model to get my feet firmly planted on solid ground. If I can keep the inventory investment, materials management data separate from the totally different data, criteria and decisions in the production cycle, we can keep a reasonably clear picture before us. Both "loops" terminate in inventory; physical units being the common data. Here we have a tie-in if management wishes. In manufacturing (where most of my experience has been) the loops have been kept operationally separate. The reason for this will appear in the next model.

This model seems to surprise everyone until a conference or workshop relates every company's (or Data Processing Equipment Salesman's) situation to it. Then everyone is astonished that the operating processes had not been considered before in these terms. This is the inside loop of Figure 1.

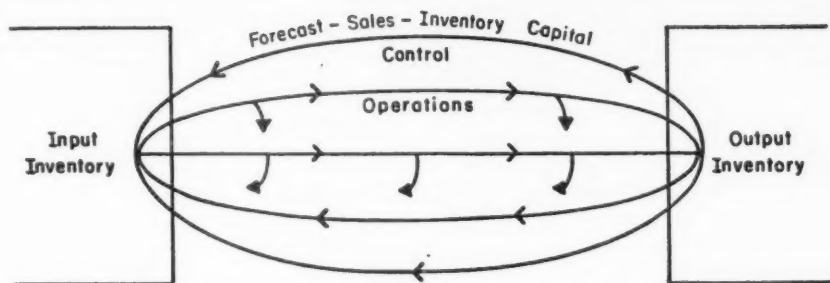


Figure 1.

Figure 2 is a model showing the basic events in converting input materials, tools and instructions into finished goods and services. It includes the sales plan and forecast input as well as the "Finished Goods on Hand" input. Lead time, or make-ready activities are here reduced to five for simplicity. Operating is shown as a series of processes ( $P_1 P_2 \dots P_n$ ), with storage transits (ST) between adjacent processes. A few information arrows are shown originating

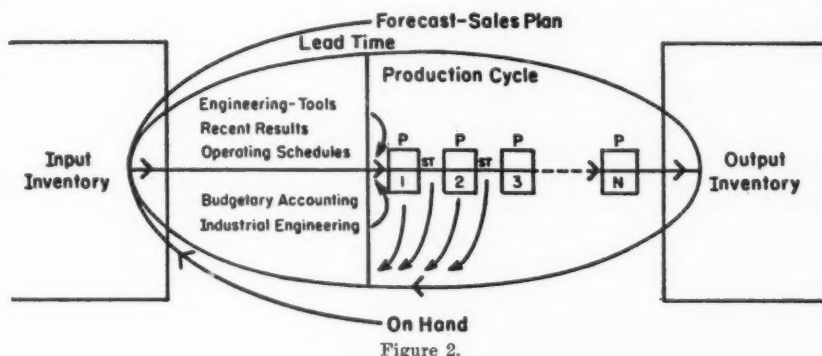


Figure 2.

in  $P_1$  &  $P_2$  and in the following ST stations, feeding into the data processing system for any corrective action.

What surprises everyone is Table I showing variable productivity indexes (as used here). The functional points of view will be recognized as authentic; however, *using* those points of view (what the people were hired for) is neglected. A rough summary of my experience in standard-setting, budgeting, cost/price estimating, methods engineering and production control follows:

TABLE I

Governing Conditions	Function, Point of View	Relative Index
Ideal, best method $C_I$	Industrial Engineer	150
Design, laboratory $C_x$	Process, Tooling Engineering	X
Standard, min., allowances $C_{BA}$	Budget and Cost accounting	120
Real, optimistic, pushing $C_{BS}$	Production Scheduling	80-100
Actual, everything $C_A$	Actual recent Mfg. experience	50



In actual situations this table may become complicated—e.g., where some new equipment is mixed with old at a process point. Also, it is hard to get people to accept the variety of ideas among them on what a particular output, at a process, for one product component should be. Data processing salesmen turn up some of the variety, but they think it is just confusion or cussedness, then do their best to get agreement on one figure! I've warned salesmen and production people alike that using one figure would stifle progress and drive underground the essential variety. It is difficult to show everyone that *each figure* is in fact *authentic*; however, it is true for a particular set of control conditions, and the progress in costs, quality, etc. depends upon spelling out all the governing conditions to get better control of them, usually by systematic steps.

Now we can see why any data processing system has to be flexible enough to protect the variety of input. Furthermore, note that the make-ready activities *inject the certainty of variations in performance* into each *schedule*. If the reader doubts this, consider only the work scheduler. The average of recent over-all experience may show an index of 50. If that's all he asks for that's all he will get, or less! He has to incorporate improvements and push the processes with his loads, or soon the outfit will shut its doors.

This is why I feel so strongly that the inside production loop must be conceived independently. It must be sensitive to experiments, innovations and excessive demands of budgeters and schedulers. It must be equally prepared to cope with inevitable, *predictable* variations in performance from schedule.

From what has been said above it may now be obvious that a system design must focus on variations, not on the simple, ideal program. Granting the need for the basic foundation, which any technician can spell out, a company's welfare requires that actual production programs be over-optimistic. Each one has to be an experiment, as it were. This is why all the anxiety about eliminated jobs among engineering, planning and other functions is nonsense. Their jobs may now, for the first time, require high competence and alertness, but they are even more essential (1) to feed into the system realistic targets and (2) to cope with adjustments later to keep the show on the road.

Realistically designed and employed, these new C.P.I. systems will be a tremendous benefit.

ALFRED B. CUMMINS

Western Reserve University

## *Document*

### **The International Exchange of Business Research**

Both the international aspects of business enterprises operating abroad and developments in foreign lands which affect the operations of these firms are commanding a growing share of the scholar's and the executive's attention. Recent books and journals devoted to these areas are testimony to this increased interest. Recognizing the needs of the businessman for information on happen-



ings in foreign lands, and on international management developments, McGraw-Hill established the *International Management Digest*. This was followed by the *International Executive*, a sophisticated readers' digest in the international field. Recently a third journal, *Management International*, has appeared. It is edited for both the scholar and the practicing executive. It demonstrates widespread recognition of the need for international exchange of ideas and research development in business, large scale institutional management, and education for business. Its aim is to serve as a bridge of communication between the countries of the world and between scholars and businessmen, fully recognizing that the distance between nations and between scholars and businessmen in the different countries varies widely.

The level of development of business practices and education for business varies widely from country to country. Scholars and executives of each country, however, can contribute much to a deeper understanding of conditions in other countries, yet the relative isolation of countries and the lack of organized and systematic exchange of ideas and research results may cause these contributions to suffer from a local bias. Generally they are primarily applicable to the country of origination and not easily transferable without modification and adaptation to different situations prevailing in other countries of the world. However, through an international exchange of ideas and more intensive research, this provincialism would gradually be reduced, and more truly universal theories and principles of business enterprise and education for business can be evolved.

Journals devoted to international business are an important step forward. Now that they have shown the way, a further step forward can be taken. The results of research, the new ideas, and the recent developments in business management and education for business in every country should be made systematically available to other countries. This could be accomplished by an "Institute" attached to a university of high academic standing. The major function of such an institute would be to serve as a clearing house for the international exchange of information. The rationale of this proposed organization is as follows:

**Name:** "Management Research International Exchange Institute."

**Purpose:** To serve the countries of the world as a clearing center for research and scientific information developed in the fields of business and education for business, and in such allied fields as economics, psychology, sociology and anthropology.

**Objective:** Provide the facility for making available to scholars, businessmen, and government officials the research and studies concerning the different problems in these fields which are underway and which have been completed in the various countries. In so doing the institute would serve to bring interested persons together and provide opportunities and the means for assisting each other in their respective objectives. It could also support the movement, which is now in different stages in the different countries, to introduce and improve

education for business and management at the university level in countries where it has as yet not received adequate recognition.

**Activities:** Collect information on research completed and underway in the participating countries in the fields mentioned, and statistical data which would be particularly useful internationally to scholars and executives. Also the institute would undertake general research projects which would make a contribution to the fields of business and management on the international level. It would also undertake specific contract research projects for corporations, foundations, and governments to help them solve international business and management problems. Its chief activity would be to disseminate on an organized basis the information on research activities and developments in the areas indicated to its subscribing members.

The desirability of the founding of such an institute flows from the increasing importance of all aspects of industry and business to the economic and social welfare of the modern industrial country and the developing country. As a result, a more rapid and systematic exchange of information between countries than is now possible is required.

ADOLPH EDWARD GRUNEWALD  
Michigan State University

## *Doctoral Dissertation Abstracts*

**Survey of Industrial Relations in Leading Michigan Road Construction Firms.** George J. Gore, (Ph.D., University of Michigan, 1960), University of Cincinnati, College of Business Administration).

This study utilized data based on 79 interviews with 62 managers in 31 companies, and selected union, government, and trade association officials. The researcher sought information on industrial relations policies and problems of the highway construction industry in Michigan.

The dissertation is in three parts: (1) background information about the industry and about the study itself, (2) the functions and philosophy of the five road-building unions and the employer associations, and (3) aspects of personnel administration which are not covered by union contract.

No one pattern of industrial relations policies and practices was observed—or could be recommended for all contractors. However, there were: (1) unique industry characteristics influencing these employers, (2) generally shared problems, (3) commonly accepted opinions and ways of meeting situations, and (4) similar opportunities for improvement. The three industry characteristics having the most impact on personnel matters are: (1)

seasonality, (2) the contract bidding system, and (3) decentralization and shifting locations of the work. The first two factors result in striking fluctuations in the work force, necessitating an abnormally large volume of hiring and discharge transactions.

**The Quantification of Managerial Decision Problems.** Herbert Goss Hicks, (Ph.D., University of Alabama, 1960), Louisiana State University, Baton Rouge, Louisiana.

Beginning with a treatment of the historical background and the rationality of quantification as an aid to management, procedures are developed for quantifying the various functions of an enterprise. Specific problem areas include profit analysis, economic lot sizes, capital goods selection and replacement, and marketing. Appropriate examples of the use of quantification in each of these subject areas are included. By extending the use of quantification to its fruition and logical conclusion, a procedure is offered through which two or more functions of an enterprise may be quantified. The managerial viewpoint is taken throughout the entire work. Thus, the following basic objectives are accomplished: (1) demonstration of the value of relatively simple mathematical techniques as aids in the

solution of managerial decision problems and to illustrate their application, (2) provision of an integrated presentation of the use of such techniques, and (3) a procedure leading toward the quantification of an entire enterprise.

**Contrasting Orientations and Career Patterns of Executives and Lower Managers.** Thomas R. O'Donovan, (Ph.D., Michigan State University, 1961), University of Detroit, Detroit, Michigan.

This research studied the career patterns and certain sources of orientations to achievement in two groups: executives and lower managers. The career pattern data consisted of the occupational background of the respondents including such areas as inter-firm mobility, geographic mobility, changes in functional area, and career speed. The hypothesis established was that executives will be characterized by a higher occupational origin of their father and wife's father than that of lower managers; that executives will have attained a higher level of education than lower managers; and, for those respondents with military experience, executives will have been discharged at a higher rank than lower managers. The central purpose of the study was to establish whether or not clear differences or contrasts exist in the background of individuals that serve to distinguish high status achievers from lower status people while such groups are still in their twenties. If such relationships hold, then it may be possible that these and other sources of orientation may vary directly with other class or status arrangements. Thus education and family class, among others, may be shown to vary upwardly from manual occupations to white collar non-supervisory positions, on through lower, middle, and executive levels. No person's eventual career level can be predicted with certainty, but the range of error might be reduced if the approach established here is successful.

Three-hundred twenty-six usable mailed questionnaire responses were obtained from a random sample of executives and lower managers from four major multiplant industrial corporations. The net response was 58%; the average age of both groups was 46. The square computations indicated no statistical difference among the major career

pattern background factors between the executives in this study and the American business leaders in the classic Warner and Abegglen 1952 study. Substantial differences did exist, however, in almost all areas established for study among the 178 executives and 148 lower managers.

The occupational level of father and wife's father, education of respondent and members of the respondents' family, and military exist rank level tended to vary directly with the occupational scalar level of the sample group. However, these differences in orientations and career patterns among the scalars studied were not extreme. A certain minority of the respondents in both groups possessed a similarity in the career pattern and orientation level of each other; therefore, it must be concluded that certain factors other than those studied in this research design are operating to influence the career achievement level of individuals.

**Ratios of Staff to Line Personnel in the Automotive Parts Manufacturing Industry.** Bruce E. DeSpelder (Ph.D., Ohio State University, 1960), Wayne State University, Detroit, Michigan.

It has been postulated that as business organizations increase in size the indirect or staff functions grow much more rapidly than the direct or line activities which they serve. To test this theory, a mail survey was made of 561 automotive parts manufacturers in 1956. The number of employees in both the total and individual staff functions was correlated with the number of production employees in order to develop personnel ratios and functional growth patterns. In addition, the data relative to the managerial spans of supervision were analyzed for the purpose of isolating significant characteristics. Adequate knowledge of functional growth trends and of the behavior of spans of supervision is of invaluable assistance in planning for an optimum organizational structure.

Three distinct functional trends are identified. First, the functions of accounting, engineering, maintenance, production planning and control, purchasing, and tools and patterns, as well as the sales and top management activities, are represented by growth curves which increase at a decreasing rate. Secondly, the inspection, personnel, plant

protection, and product and materials handling functions and the multiple-assignment category are characterized by straight-line relationships since their rate of growth is constant. Thirdly, there are ten other functions which could not be described by the use of refined statistical techniques. They include the functions of traffic, finance, advertising and sales promotion, sales planning and analysis, Corporate Secretary, organization planning, public relations, legal counsel, economic research, and tax counsel. In general, there is no evidence that these ten functions grow more rapidly than the line activities they serve. Finally, it should be noted that if all the indirect or staff functions are taken in total, they are best represented by a growth pattern which is marked by a slightly negative rate of acceleration. Thus the study does not support the belief that indirect or staff functions tend to grow in an uncontrolled or unreasonable manner.

Another significant finding is that jobs involving mainly physical duties permit wider spans of supervisions, both executive and operative, than do those which consist primarily of mental or clerical tasks. Thus the average of the spans for inspection, maintenance, plant protection, product and materials handling, production, and tools, and patterns is from two and one-half to three times as large as that for accounting, advertising and sales promotion, engineering, finance, personnel, production planning and control, purchasing, and traffic. In addition, the span of supervision data confirm the well-established hypothesis that the unit of operative supervision is always larger than the unit of executive supervision. It is also evident that the proportion of executive personnel decreases as companies grow in size while the proportion of supervisors remain fairly constant.

## *Management News and Notes*

### *Academy of Management News*

#### **C.I.P.M. Membership**

President George R. Terry has announced that the Academy of Management has been admitted to the Council for International Progress in Management. Harold F. Smiddy has been named Representative to this body for the Academy and he will attend the group's Board meetings held in New York City three times a year.

#### **Acquisitions Committee**

William Fox has been appointed Chairman of a new Acquisitions Committee for the Academy. The purpose of this committee will be to study the problems of developing outside support in various forms for the activities of the Academy. Thirteen members have agreed to serve on the committee.

#### **1961 Annual Meeting**

Harold F. Smiddy, Vice President of the Academy is Program Chairman for the 1961 annual meeting which will be held in conjunction with the Allied Social Science meet-

ings in New York City, December 27-29. The New York University Graduate School of Business Administration will be Host University for the Academy meetings. E. H. Van Delden will serve as Chairman of the Arrangements Committee. Peter Drucker and Arthur Svenson will serve with him as Deputy Chairmen.

#### **Western Division—Academy of Management**

New officers have been elected, as follows: President, Dean Austin Grimshaw, University of Washington; President-Elect, William Voris, Los Angeles State College; Vice President and Program Chairman, Keith Davis, Arizona State University; Secretary-Treasurer, Dale Yoder, Stanford University. The 1962 meeting will be in April at Arizona State University.

#### **Research and Publications Committee**

Chairman Preston P. LeBreton announces that forty-three proposals were submitted for the 1960-1961 research grant program ad-

ministered in cooperation with the American Management Association. All of these were recommended to the AMA for consideration, with ten being selected as the most highly recommended.

#### Distinguished Management Award

At the 1960 annual meeting a resolution was passed to present a gold medal called the Distinguished Management Award of the

Academy of Management to that person who has made a contribution of material importance to management theory or practice and is recognized as an outstanding student of management. Professor Ronald B. Shuman is heading a special Awards Committee which is setting up the terms of the award, the design of the medal, and deciding the time and place of the presentation.

## News of Organizations and Institutions

### Southern Case Writers Association

M. M. Hargrove, Dean, College of Business Administration at the University of Tulsa, is President of the Southern Case Writers Association, and is spending part of the summer writing policy cases involving the behavioral sciences.

### University of Miami

Grover A. J. Noetzel, who has been Dean of the School of Business Administration at the University of Miami, Coral Gables, Florida, for the past thirteen years is giving up administrative work to return to his former position of Professor of Economics and Business in the autumn of 1961. Clark E. Myers will be the new Dean of the School of Business Administration, and Professor of Management. Dean Myers was formerly Professor of Management at the Harvard Graduate School of Business Administration.

### University of Florida

The College of Business Administration and the Department of Management have developed new core curricula. The new college core includes increased mathematical requirements presupposing three years of mathematics in high school. Eight hours are devoted to college algebra, trigonometry, and aspects of set theory, analytic geometry, and the calculus of polynomials which are particularly relevant to the social sciences. Corporate finance, public finance, and money and banking have been synthesized into a new six-hour sequence. Heavier emphasis will be placed upon inferential statistics in the first three hours of statistics and the second three hours will stress analysis of variance, multiple and partial correlation,

and sample design. A new three-hour basic course in the behavioral sciences is designed to acquaint students with major concepts employed in the disciplines of psychology, sociology, cultural anthropology, and related areas, as a basis for the development of a conceptual framework for understanding human behavior. The new core curriculum in management comprises four courses which build upon the College core and represents the following areas: organization theory, operations research, personnel concepts and human relations, and government regulation of business.

### University of California

The Institute of Industrial Relations, University of California, Berkeley, will start publication of a new academic journal in the autumn of 1961. The periodical, to be called *Industrial Relations*, will be issued three times a year and will follow an interdisciplinary and international approach.

Margaret S. Gordon, Associate Director of the Institute, will be Managing Editor. Other appointments are: B. V. H. Schneider, Assistant Editor; William E. Rogin, Business Manager. The Board of Editors will include: Arthur M. Ross, Chairman, Benjamin Aaron, Reinhard Bendix, Irving Bernstein, Earl F. Cheit, Walter Galenson, Joseph W. Garbarino, Mason Haire, Clark Kerr, Seymour M. Lipset, Philip Slezniak, and Lloyd Ulman.

### Oklahoma State University

The College of Business has inaugurated a new MBA degree program, with emphasis on quantitative analysis and the behavioral sciences. The program will be administered by Professor Jack Wagle. The College re-



tains its MS programs in accounting, economics, and business education.

### The University of Oklahoma

Doctoral programs in business administration were started in September, 1960. Both the Ph.D. and the DBA degrees are now offered.

### College and University Personnel Association

Dr. Charles T. Clark, President of the College and University Personnel Association, announced that as of October 1, 1961, this Association will sponsor a professionally staffed national placement service for college and university administrative officers, and for other categories of a professional nature. Positions of administrative responsibility in practically all areas of higher education will be included except those directly concerned with academic administration, such as deans and presidents. This service will provide a central point for placement and referral for administrative and professional positions in business management, housing, food service, personnel, accounting, purchasing, public relations, admissions, student personnel administration, etc.

### Midwest Management Faculties

Members of the Midwest Management Faculties held their annual meeting at Bowling Green State University May 28 and 29.

Ninety professors representing forty-two schools were present. Ralph C. Davis and George R. Terry were present, and answered questions on the matter of possible affiliation of the Midwest group as a division of the Academy of Management. Rollin Simonds was named Chairman of a sub-committee to implement plans for formal affiliation. Other members of this committee are Robert D. Henderson and Bruce DeSpelder.

### San Diego State College

The management curriculum at San Diego State College has recently been revised. Requirements in fields outside of business have been increased. Core requirements include a minimum of 12 credits in mathematics. Courses have been revised and new courses developed. Dr. David Belcher is Chairman of the Management Department.

### University of Pittsburgh

Marshall A. Robinson was appointed Dean of the newly established School of Business Administration at the University of Pittsburgh. Only graduate degrees will be offered after 1965. The following appointments were made: Chairman of the Faculty, Merrill J. Roberts; Director of Graduate Programs, Paul B. Kohberger; Director of Special Studies, H. J. Zoffer; Director of Management Problems for Executives, C. L. Van Sickle.

## Notes About Persons and Places

Robert H. Cojeen has been promoted to Professor of Business Administration at the Flint College of the University of Michigan.

Leonard J. Kazmier, formerly at Wayne State University, has been appointed Assistant Professor in the Department of Business Organization and Management at the University of Notre Dame.

George J. Gore has been promoted to Associate Professor of Management at the University of Cincinnati.

Max S. Wortman, formerly of the University of Minnesota, has been employed as Assistant Professor to teach personnel management and industrial relations, at the State University of Iowa.

George Calvin Hoyt, formerly of San Jose State College, California, has been employed as Assistant Professor to teach intermediate management theory and human relations, at the State University of Iowa.

Harold Smiddy, Vice President of the General Electric Company, gave the commencement address at Ithaca College, and received an honorary Doctor of Laws degree on June 3, 1961.

J. P. Schwitter, Professor of Industrial Production, Kent State University, received a Ford Foundation Fellowship to attend the Institute in Basic Mathematics at the Wharton School of Finance and Commerce in the summer of 1961.



Rexford C. Houser, Assistant Professor of Management at the University of Southern Louisiana has received a Harvard Business School fellowship beginning in the fall of 1961, for study towards the DBA degree.

Andrew Barta has returned to the College of Business Administration, Syracuse University after a three years' leave to serve on an ICA project for the establishment of a Department of Business Administration at the Eliezer Kaplan School of Economics and Social Sciences of the Hebrew University, Jerusalem, Israel. At Syracuse he assisted in setting up an MBA Program at Utica College of Syracuse University. He has also resumed work as a labor arbitrator with the New York State Board of Mediation. He has collaborated in writing manuals for ICA for overseas use in the areas of Wage and Salary Administration, and Personnel Records and Reports.

Earl Planty conducted his highly successful two-week Senior Seminar in General Management in Buck Hill Falls, Pennsylvania, during the summer of 1961.

Charles Klason has resigned from Arizona State University to become Assistant Professor of Management at the University of Texas.

Bruce McSparrin will return to Arizona State University, as Associate Professor of Management, after a year at the University of Oklahoma.

Harold Fearon and Sherwood G. Huneryager will join the faculty at Arizona State University in September, as assistant professors of management. Professor Fearon will complete his doctorate at Michigan State University, and Professor Huneryager has completed his doctorate at the University of Illinois.

Albert E. Wolff has been appointed Associate Professor of Management, College of Business Administration, the University of Tulsa. He has his Ph.D. degree from the University of Texas, and will teach business statistics.

On July 1, Joseph W. Towle, Powell Niland, Merle Welshans, and Charles Lapp of Washington University went to Korea to

conduct an executive development program for businessmen and government officials. This is the third summer during which the Graduate School of Business Administration at Washington University has collaborated with the University of Korea and Yonsei University in sponsoring this program.

E. H. Van Delden, Professor of Management at New York University Graduate School of Business Administration has accepted a UNESCO appointment as a member of the Commission on a Federal University in Lagos, Nigeria. He will spend the summer in Lagos.

J. W. Cowee has been appointed Dean and Chairman of the Department and Schools of Business Administration, at the University of California, Berkeley. Frederick E. Balderston has been appointed Director of the Management Science Center, and Austin C. Hoggatt has been appointed Director of the Computer Center.

James D. Thompson, Director of the Administrative Science Center, University of Pittsburgh, has completed a research project, in collaboration with Robert W. Avery and Richard O. Carlson, entitled "A Framework for Relating the Sociology of Occupations with Personnel Management."

Alex Simon has accepted a position at Southwestern Louisiana University, after serving four years as Assistant Professor in the Department of Management at the University of Oklahoma.

Ronald Shuman and William H. Keown are teaching full time in the five-week Summer Executive Development Program at the University of Oklahoma.

John James of Indiana University will join the Department of Management and Business Law at the University of Florida in September, as Assistant Professor of Management.

Leslie A. Bryan, of the University of Illinois, is serving as member of a Presidential Task Force to formulate national goals for aviation during the next 10 years.

Laurence Hackmack has been appointed Professor and Chairman of the Department of Management and Finance in the College

of Business Administration at Northern Illinois University at DeKalb. He has resigned his post as Associate Professor of Management at the University of Massachusetts, but will continue as National Educational Policies Director for the American Production and Inventory Control Society in Chicago.

Paul S. Greenlaw has joined the faculty of Pennsylvania State University as Assistant Professor of Management, after having served as Director of Management Development for the Dayco Corporation in Dayton, Ohio.

Harold Puff, Associate Professor of Industrial Management at Miami University, has been awarded a Fellowship in the "Economics in Action" program sponsored by the Case Institute of Technology in Cleveland for four weeks.

Robert D. Hay, Professor and Head of Management, University of Arkansas, is engaged this summer in writing up a case problem involving bowling alleys for the Southern Case Writers Association.

James E. Estes, Assistant Professor of Management, University of Arkansas, is currently participating in a program of the Foundation for Economic Education, visiting an oil company in New York.

William Newman, Samuel Bronfman Professor of Democratic Business Enterprise at Columbia University, together with a colleague, Thomas L. Berg, Assistant Professor of Marketing, are conducting a six-weeks seminar from May 29-July 7 at the Faculty of Economic Sciences of the University of Buenos Aires. This is part of a three-year cooperative venture between the Graduate School of Business at Columbia and the Faculty of Economic Sciences, where a recently inaugurated program has introduced the innovation of a curriculum leading to degrees in Business Administration. In addition, various present and prospective professors of the Faculty of Economic Sciences will travel to Columbia each year to undertake intensive study of Business Administration here. This summer Professor Newman will also participate in Columbia's Executive Program in Business Administration at Arden House, and the

Management Program for International Operations (Latin America), also at Arden House; Penn State's Executive Management Program, and the Advanced Bank Management Seminar of the Pacific Coast Banking School at the University of Washington in Seattle.

Hall Logan will retire this summer from the Convair Division of the General Dynamic Corporation, and will join the management faculty at the University of Arkansas.

Robert D. Henderson, Chairman of the Department of Business Administration, Bowling Green State University, was one of eighteen selected to participate in the Industrial Relations Section of the New Development in Business Administration Faculty Seminar to be held on the Berkeley campus of the University of California from August 6 to September 1, sponsored by the Ford Foundation.

Phil Carroll was initiated into Tau Beta Pi, the honorary engineering fraternity, at the University of Michigan in April, 1961. He has been appointed Chairman of the Executive Committee of the General Engineering Department of the American Society for Mechanical Engineering, as one of four committees whose task is to bring together ASME divisions that have mutual interests. Mr. Carroll has also been appointed to the Advisory Committee of the Industrial Engineering Department of Newark College of Engineering.

C. Wickham Skinner, Lecturer in Business Administration at Harvard University, received his doctoral degree in March, 1961, and is currently teaching Production Management at the Harvard Business School.

James H. Healey, management consultant and part-time Associate Professor of Management at Ohio State University, has been conducting a series of four one-week management institutes for the National Management Association at Granville, Ohio, during 1961. Other Academy members who participate as discussion leaders include John Mee, Michael Jucius, Bill Schlender, William Moeckel, and Edmond Curcurn. James H. Healey will return for the third year to Chile to act as team leader and faculty leader for

the general management area of Operacion JEFE 1961 in Vina del Mar.

Edward M. Barnet of Michigan State University and Dean Richard Donham of Northwestern University, returned this summer to Venezuela to re-appraise the Advanced Management Program they started in Caracas in 1956-57. Professor Barnet was recently appointed Director of Graduate Programs for the Degree of Master of Business Administration in the Graduate School of Business Administration at Michigan State University. He is retaining his post as Director of the Executive Development Program in Food Marketing Management.

Ralph Everett Balyeat has been appointed Associate Professor of Management at the University of Georgia, effective September 1, 1961. He was formerly Associate Professor of Management at the University of Wichita.

Clifford M. Baumbach of the State University of Iowa Bureau of Business and Economic Research is Chairman of the National Committee on Language and Technique of the American Protection and Inventory Control Society. The Committee's mission is to evolve a language of standard definitions and the publication of a dictionary in the fields of production and inventory control, and the publication of a handbook of production and inventory control techniques.

Harry W. Stephenson has been appointed Instructor in Management at the University of Texas.

Virgil James, Associate Professor of Management at the University of Texas, spent the academic year 1960-1961 with the Socony-Mobile Oil Company in New York.

Arthur M. Whitehill, Reynolds Professor of Human Relations in Industry, University of North Carolina, and Shin-ichi Takezawa, Professor, School of Social Relations, Rikkyo (St. Paul's) University in Japan, are the co-authors of Research Paper No. 5, *Cultural Values in Management-Worker Relations*, published by the School of Business Administration, University of North Caro-

lina. Professor Takezawa will be at North Carolina as a Visiting Professor during the fall semester of 1961. He and Professor Whitehill plan to study cultural values in organization and decision-making.

Dalton E. McFarland, Professor and Head of the Department of Personnel and Production Administration, Michigan State University, has received a Social Science Research Council grant providing travel expenses for attendance at the annual meeting of the Institute of Management Sciences in Brussels, August 23-25.

Bernard D. Perkins, Professor of Management, School of Business, State University of South Dakota, will be one of the participants at the Faculty Seminar on Simulation and Management Games to be held at Carnegie Institute of Technology in August.

Paul Cone has been named Associate Professor and Head, Department of Business and Industrial Management at the University of Southern California.

Schuyler Otteson, Chairman of Marketing at Indiana University and Editor of *Business Horizons* will teach at the Instituto Post-Universitario per lo Studio Dell 'Organizzazione Aziendale, at Turin, Italy, during the first half of 1962.

John T. Doult has been appointed Professor and Head, Department of Industrial Production at Kent State University, effective September 1, 1961.

Arthur B. Moss will join the faculty of the Amos Tuck School of Business Administration, Dartmouth College, on September 1, 1961, to teach the business policy course.

Arthur G. Anderson has taught at California Western University since his retirement from the University of Illinois in 1955. He is now giving full time to the task of supervising six new building construction projects.

Arthur Elkins will take a one-year leave of absence from the Department of Management at the University of Massachusetts to begin study on his doctoral degree at Indiana University.

Walter G. O'Donnell has this summer been an advisor in the reorganization of the graduate program at the University of Puerto Rico. He will deliver a paper on "A Syncretic Approach to Management Decision-Making" at the T.I.M.S. meeting in Brussels in August.

Ernest Dale won the McKinsey Foundation Award for the best article published in Volume II of the *California Management Review*. The article cited was "Some Foundations of Organization Theory," in the Fall issue, 1960.

Leon C. Megginson of Louisiana State University has received a Southern Case Writers Association research grant to write cases this summer. He has also received a Fulbright Award to Spain where he will be attached to the University of Madrid to do research in the selection, development and motivation of managers in a mature economy. He did a similar study for the Small Business Administration here last year, and will compare the two countries in these respects.

William E. Hurley, since April 1960, has been Chairman of the Logistics Management Department in the School of Logistics conducted by Ohio State University for the Air Force at Wright-Patterson Air Force Base.

Sidney J. Claunch will join the faculty of the Department of Management at the University of Massachusetts at the rank of Associate Professor. He formerly served at the University of Nevada for seven years.

Thurlo F. Johnson has been appointed Lecturer in Management in the Department of Management at the University of Massachusetts.

Harold Wein, Professor in the Department of Personnel and Production Administration at Michigan State University, has received a grant of \$50,000 from Resources for the Future, Inc., for a two-year study of the metals complex and the development of the manufacturing belt.

Preston P. LeBreton of the University of Washington will deliver a paper entitled "A Vital Step Toward the Development of

a General Theory of Planning," at the T.I.M.S. meeting in Brussels, August 23-26.

William E. Green is spending the summer of 1961 on research under a Small Business Administration grant to the University of Mississippi. With three colleagues, he will attempt to appraise the use of consulting services by selected small business firms.

John E. Burns, currently serving as Chairman of the Academy's Public Relations Committee, teaches in the Department of Management at DePaul University in Chicago, and is Editor of the periodical *Industrial Management*. This publication has wide circulation in industry, and is published monthly by the Industrial Management Society. Professor Burns contributes a regular column on labor relations.

Norman Deunk has developed a complete one-year course in Management Education for the N.M.A.A. in Cleveland, Ohio, and for use within the IBM Corporation. In July he participated in the Management Development Program at the University of Michigan.

Wyeth Allen, Chairman of the Department of Industrial Engineering at the University of Michigan, reports that his department has received a number of research grants to continue its program of Work Simplification in hospitals, and a grant for research on simulation. Also, a research contract with the M. T.M. Association for the study of times and motions has been continued for another two years.

Interest in management methods is taking a forward step in the European Common Market countries, according to Walter Mitchell, Jr., Executive Director of the Society for Advancement of Management. He has just returned from a five-week tour, conducting management seminars at the request of management associations and universities in five countries: Netherlands, West Germany, Italy, Turkey and Spain.

Irving Abramovitz will become Associate Professor in the Department of Business Organization at Ohio State University September 1. He has been Vice-President of Manufacturing at the Carlon Products Corporation in Aurora, Ohio.

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